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CHEMICAL WEEKLY

VOL. XXXIII JULY 19, 1988 NO. 45

20 JUL 1988

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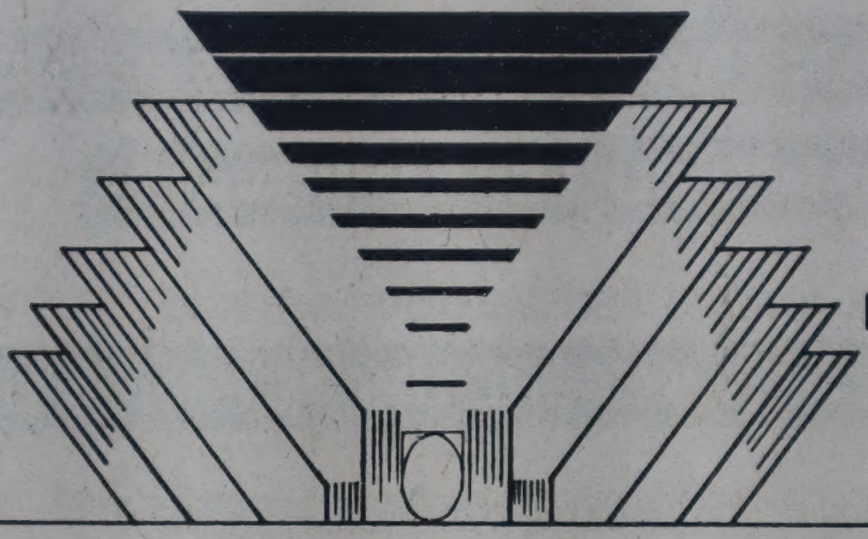

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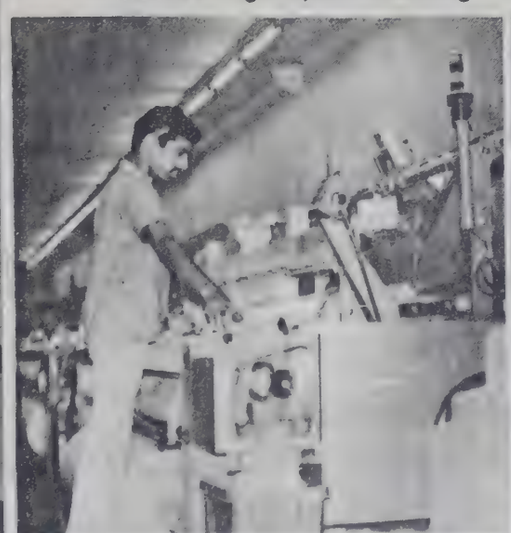

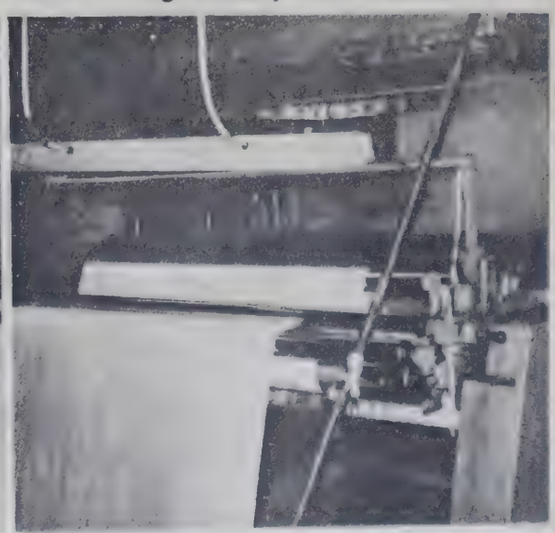

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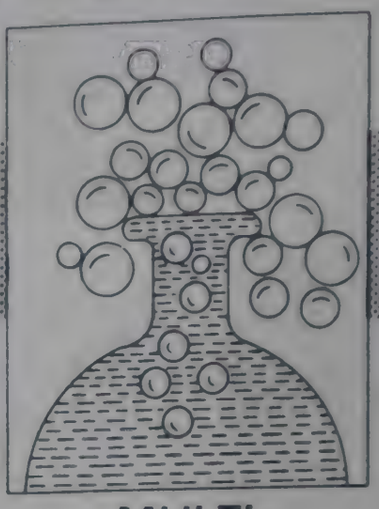

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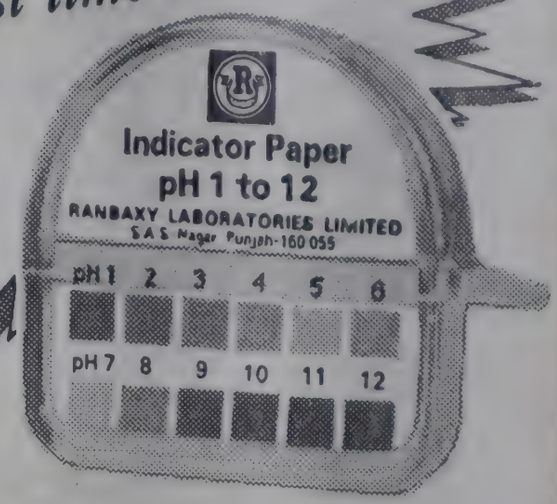

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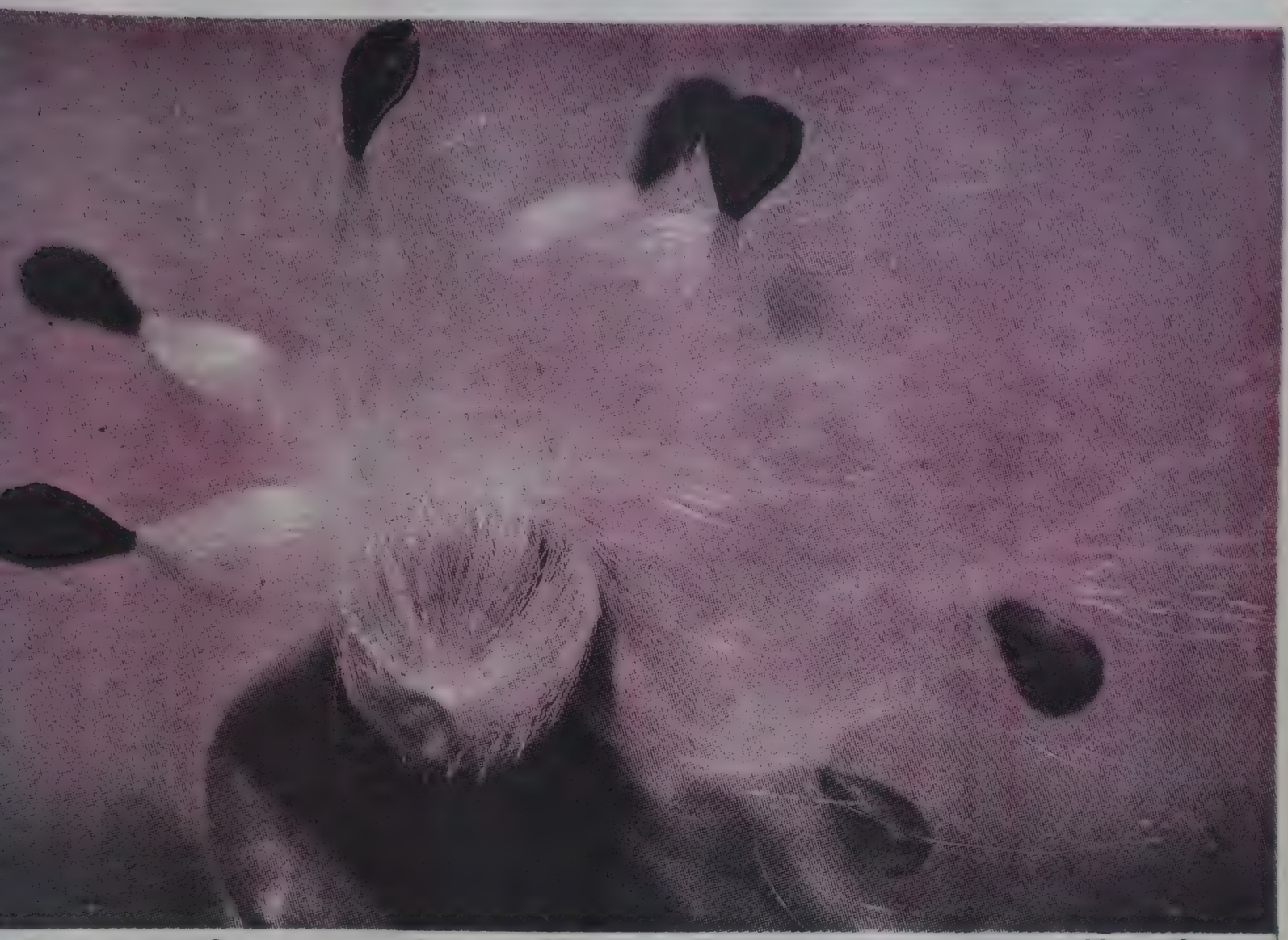

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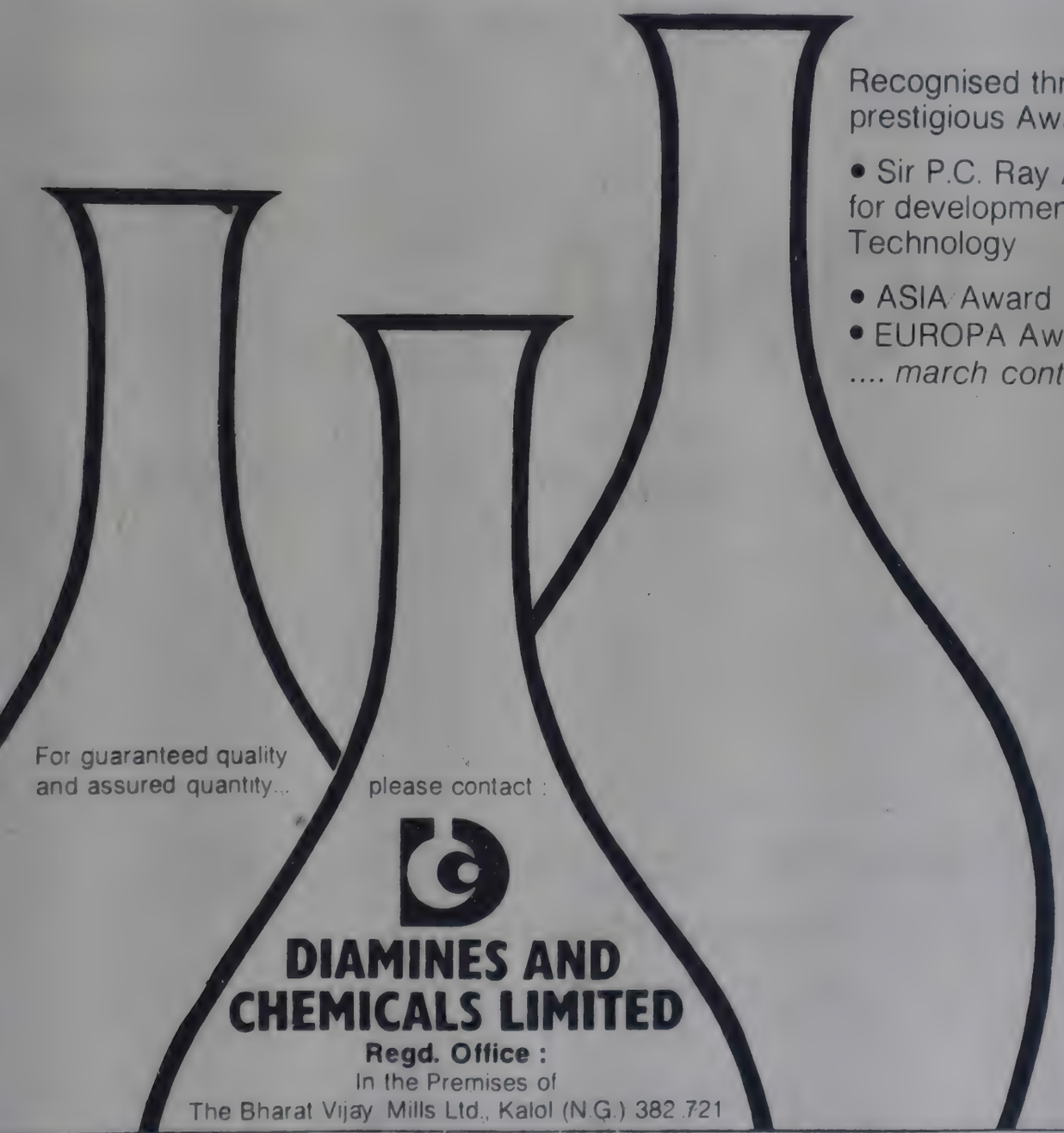

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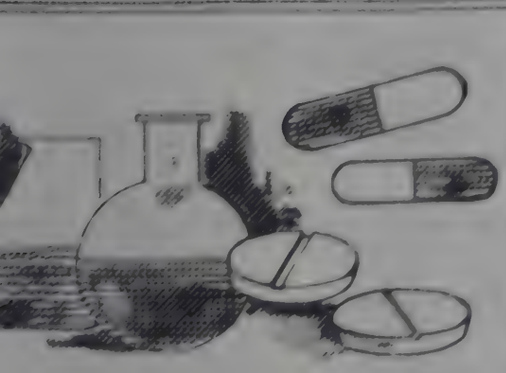

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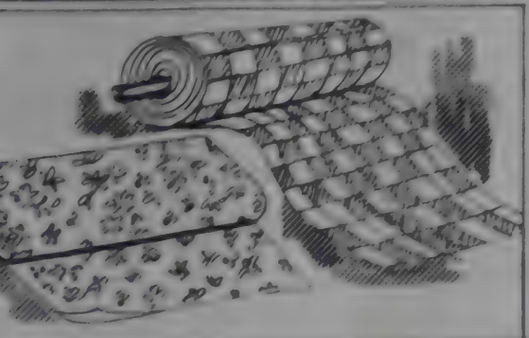

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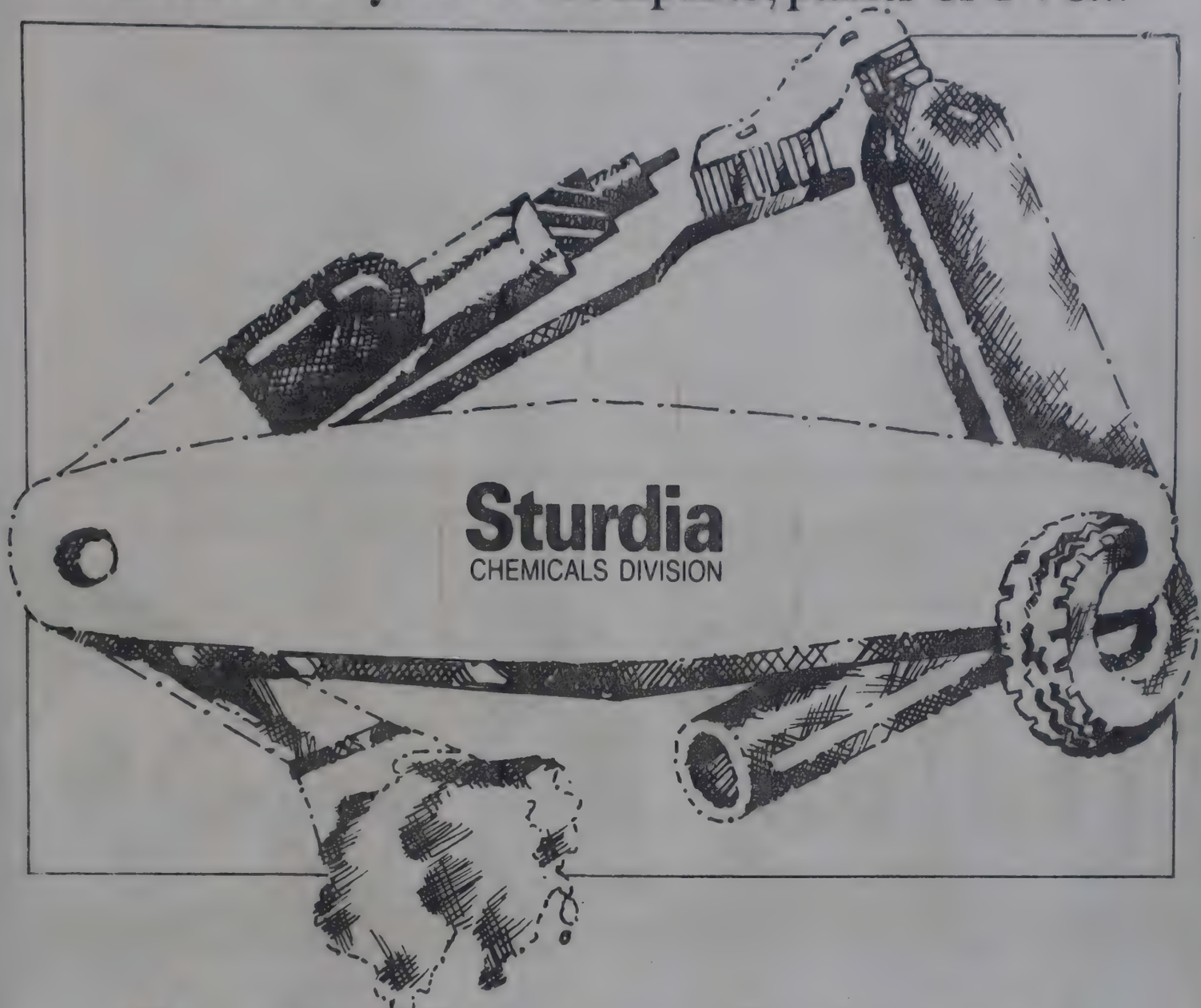

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CHEMICAL WEEKLY

VOL. XXXIII JULY 19, 1988 NO. 45

Aluminium Survey

Aluminium holds great promise in the industrial development of the country in view of its potential applications in strategic and vital sectors. India is endowed with immense bauxite reserves of the order of 2650 million tonnes thus holding the fifth position in respect of world bauxite resources, the other four countries ahead of us being Australia, Brazil, Guinea and Jamaica.

The output of aluminium could be increased to a peak of 2.78 lakh tonnes in 1987-88 only because of the contribution of 25,000 tonnes by National Aluminium Company, the new large undertaking in the public sector. The operations of the Alupuram, Belgaum and Hirakud smelters of Indian Aluminium Company and that of MALCO in Metturdam were seriously affected by power shortage and INDAL particularly could utilise only a fraction of its capacity.

Hindustan Aluminium and Bharat Aluminium, however, are comfortably placed and the two companies accounted for the bulk of the production, HINDALCO having a rate of annual production which is now around 2.3 lakh tonnes and BALCO one lakh tonnes. Even with a higher output, imports had to be permitted as consumption is about 3.4 lakh tonnes. The availability of this light metal from indigenous sources in 1988-89 may be much better than in 1987-88 as NALCO may be raising its share to even 65,000 tonnes under favourable circumstances.

Scope for Eliminating Imports. If the curbs on power consumption in Orissa and Kerala do not turn out to be as severe as in the past year and there was also a lower average cut in Karnataka, aluminium production could rise by over 50,000 tonnes and there will be only a marginal gap between demand and supply. There is thus scope for reducing imports of aluminium significantly in the coming months and effecting a sizeable reduction in foreign exchange expenditure. The situation may, of course, be comfortable in 1989-90 as NALCO may be raising its operating ratio noticeably and there may even be a surplus if there is no pronounced growth in consumption of aluminium for industry and other purposes.

HINDALCO's Bid for Fresh Expansion. The existing smelter of Hindustan Aluminium Corporation Limited is functioning at full capacity. In view of the relatively lower capitalization, the management has submitted an application to the Government for increasing its capacity by one lakh tonnes of virgin metal from the present level of 1.50 lakh tonnes. However, the installed capacity at present is only 1.20 lakh tonnes and the output in 1987 was almost unchanged at 1.23 lakh tonnes. There has been an increase in the production of alumina to 2.32 lakh tonnes from 1.95 lakh tonnes. If the smelter capacity is to be increased by one lakh tonnes, there will have to be a corresponding improvement in alumina production and captive generating capacity. However, the supply situation is bound to improve distinctly as NALCO is yet to get into its full stride and it was even suggested that the use of aluminium for various purposes would have to be encouraged if exports could not be effected in the desired volume.

Modernization of Rolling Mill. HINDALCO's plans regarding expansion and creation of additional capacity for rolling products may be unfolded in the light of new developments. It is of course, implementing now a modernisation programme of the rolling and extrusion units and adopting measures for effecting a significant saving in energy consumption. The expenditure on various schemes could be easily met with internal resources and borrowed funds and fresh capital may have to be raised only for bigger projects.

With the gradual build up in smelting capacity, the production of aluminium in the country has been continuously increasing. From a mere 4095 tonnes in 1950-51, the production reached a level of 2,76,492 tonnes in 1984-85. There was a slight set back at 2,64,826 tonnes in 1986-87, mainly due to power shortage to the aluminium smelters in Karnataka, Orissa and Tamil Nadu. In 1987-88 the production was expected to cross 3 lakh tonne-mark, with the National Aluminium Company (NALCO) having commenced production. The production last year totalled 2,74,590 tonnes, again adversely affected due to power shortage.

Considering the state of the affairs, the moot question is whether we will be able to achieve self-sufficiency, in aluminium production or continue to be a net importer of this vital metal required for various strategic uses. The working group on non-ferrous metals for the Seventh Plan had estimated 4.76 lakh tonnes aluminium capacity in the country during 1987-88 and a production of 3.93 lakh tonnes against projected demand of 4.00 lakh tonnes. Against this the production has turned out to be only 2.74 lakh tonnes.

The working group has estimated the installed capacity to go up to 5.80 lakh tonnes during the current year and production to be further stepped up to 4.83 lakh tonnes. Against this, the total demand has been estimated at 4.36 lakh tonnes, leaving a surplus of 47,000 tonnes by the end of current year. The production during next year is estimated to go up to 4.99 lakh tonnes. The annual demand is expected to nearly double at one million tonnes by the turn of the century. About a year ago, when NALCO was about to be commissioned, there were several exercises car-

ried out by various government and private agencies to explore the possibilities of introducing new applications of aluminium in India as it was expected that India will become surplus in the metal after NALCO went into full stream.

Aluminium is finding increasing share in the building and construction sector as it replaces wood and thereby promotes conservation of forest resources. Aluminium has successfully replaced wood in a variety of applications such as window frames, door panels, partitions, false ceilings etc. Attempts are being made to introduce aluminium as roofing material, hardware fixtures etc. With the trends for urbanisation, aluminium holds promise to penetrate the traditional market for wood. Organic coating of aluminium coils is a recent technological development, leading to the production of high quality uniformly coated strips with enhanced corrosion resistance, excellent colour, pleasing appearance and improved electrical insulation. The coated products are expected to replace or minimise consumption of wood or plywood for furniture doors, window frames, interior claddings etc.

A project for making designs for aluminium furniture to be used in offices and school buildings has been taken on hand by the National Institute of Design. Aluminium is, slated to enter the transport sector in a big way. Aluminium's intrinsic property, predominantly its lightness coupled with high strength to weight ratio, ease of recyclability together with high scrap value as compared to other competing materials gives it an edge over other materials for improving performance and achieving fuel economy.

The three major areas of aluminium application in transport sector are (1) autombiles (car, jeeps, trucks etc.) (2) railways (wagons and coaches) and (3) aeroplanes. The specific areas in the above sectors are (i) engine components, (ii) structural components, (iii) radiators and (iv) body sheets. Potential areas for aluminium use are brake components, body stamping, electrical systems, steering components, rim, etc. Use of aluminium in trucks and bus bodies and floors reduces the body weight by almost a loadability with consequent fuel saving and profitability.

Aluminium has come to be extensively used in both passenger coaches and wagons on the Railways. In India however, its usage is confined to sliding dooors, window grills and shutters and almost no aluminium is used on coaches. Aluminium cart is a new product which can replace the traditional wooden carts in our rural sector.

Aluminium will continue to be the dominant material for aircraft application although recently it has come under increasing pressure from carbon reinforced and other composite materials. In aerospace industry what really matters is performance effectiveness rather than cost effectiveness. The recent lithium, aluminium alloy offering much higher degree of strength and stiffness are being evaluated by the Boeing Company of the USA. In the Indian context, the share of aluminium in the electrical sector is the highest owing to increasing substitution of copper conductors. India is in fact a pioneer in replacing copper by aluminium as a conductor of electricity. The consumption of EC grade aluminium has risen from a mere 17,500 tonnes in 1960-61 to 120,000 tonnes in 1986-87. Besides cables and conductors, aluminium in the electric sectors finds outlet for the manufacture of winding wires, strips, transformers, fans, bus bars, etc.

An aluminium alloy conductor (AAAC) having higher electrical conductivity to weight ratio as compared to ACSR of equivalent diameter and wire size is a distinct improvement over the conventional ACSR conductors currently in use. Copper and brass vessels have been progressive replaced by aluminium and stainless steel. Aluminium is dominating th scene of kitchenware.

Technological developments have brought new revolutionary coatir GALVALUME with properties and characteristics superior to that of co ventional galvanised steel. Galvalume consists of 55% aluminium, 43.4 zinc and 1.6% tin. In terms of durability Galvalume provides 2 to 4 time better corrosion resistance than galvanised steel with an equivalent thic ness. The largest single outlet for Galvalume has been for building panel It is expected to find outlets as washers, dryers, refrigerators, ventir machines, air conditioners, toaster ovens etc. SAIL are exploring the fea sibility of using Galvalume in place of Zinc for galvanizing in the cold ro ling mill at Bokaro.

Aluminium in the form of sheets and foils is being used extensive in packing and containers, pharmaceutical strips, tea chest lining, mi bottle tops, where it has replaced tin. The Government have been encou raging aluminium foils industry. Besides existing four units, four new unit are coming up – Annapuram Foils, Synthetic Foils, Pradeshya Industria and Investment Corporation of Uttar Pradesh and Gujarat Industrial Deve opment Corporation of India.

In the advanced countries the per capita consumption of aluminiur is reckoned as one of the indices for assessing the standard of living Whereas the per capita consumption is 18 kgs. per annum in Japan, 2 kgs. in USA, the same is hardly 0.4 kgs. in India. This underlines th tremendous scope and potential for increasing the uses of aluminium i the country, which is endowed with rich natural bauxite deposits. There are at present seven smelters being operated by the five companies. The present installed capacity for the production in the country is 3.62 lak tonnes per annum, and when NALCO goes into full production in 198 the installed capacity will increase to 5.80 lakh tonnes. Under automati growth, HINDALCO has been allowed expansion from 1.20 lakh tonne to 1.50 lakh tonnes per annum. The licensed capacity of primary alu minium will thus be 6.10 lakh tonnes.

With NALCO slated for a production of over two lakh tonnes per annum there was general optimism that the days of scarcity would be over an actual users engaged in manufacture of traditional products made ou of aluminium would not only receive their normal requirements of meta without any difficulty but would also be compelled to diversify their pro duction with a view to consume the additional supply that would be avail able.

MMTC, which normally imported metal ranging from 20,000 to 50,00 tonnes per annum during the last few years to bridge the gap betwee demand and supply, was advised to stop imports, on account of the anti cipated flow of metal from NALCO. As a result, the imports by MMTC of commercial grade aluminium have totally stopped. On the other hand NALCO, which was expected to have supplied about 15,000 tonnes o metal per month by now, as per their projections, has been able to supply only about 5,000 tonnes of metal per month. Thus, the actual users are facing a serious crisis in running their plants for want of adequate sup plies of the metal.

In spite of these problems of a passing nature, aluminium industry can certainly look forward to an era of prosperity.

– T.P.S. RAJAN

CHEMARENA

S.L. VENKITESWARAN

Food Processing

We have now a Minister in the Government of India n charge of Food Processing and nothing else, even the Minister is not much known for his abilities. This Ministry is presumably constituted at the behest of the Prime Minister who is anxious to provide a better return o the agriculturist for his produce through the added values. It is difficult to visualise such a benefit to the armers and growers who mostly survive on a subsis-ence level.

Most food crops are processed before consumption except some vegetables and fruits. Flour mills are essential for wheat even if they are small chukkies. Paddy is processed for removal of the husk and bran - much of it after a process called par-boiling. The larger paddy processing units have taken over in many places because of the value for by-product bran (rice bran oil) and husk. Other food grains also go through some pro-cessing before they are fit for consumption.

Barley for example is processed to malt and beer. Wheat milling also provides alternate products like soji and maida which fetch higher prices to the processor - certainly not to the grower who delivers his produce at stipulated prices to the Government agencies. Even f they sell to the private trade there is not much to gain except in times of acute shortages and if the producer has enough holding power. One finds little succour for he farmer/producer of food grains through the proces-sing stages which are already in practice. Even the large scale developments in rice bran oil benefit only the pro-cessor of the bran and oil with no residuary benefit to he grain producer.

Another food industry is that based on sugar cane yielding sugar, gur, khandsari and the potential of fibre or paper industry. There is a large organisation for the sugar and vanaspati industries in the Ministry of Food and Agriculture. Sugarcane produced is sold for proces-ng to sugar at stipulated minimum prices but often at higher levels due to the present day conditions. The cooperatives of sugarcane producers own and operate sugar factories and derive much higher returns on their sugarcane in the case of well-managed sugar factories. The gur produced by the farmer from his own sugar-cane in very inefficient outfits and the khandsari sugar (non-vacuum pan sugar) is also in small units at a low level of sugar recovery. When conditions permit the sug-arcane producer gets a higher price and the khandsari producer makes this up by a high price for the bypro-duct molasses. There is a complex organisation at state level and at the centre to direct the sugarcane to spec-ified consumers (sugar factories) and there is little free-dom of sale of the sugarcane or any added return to the farmer.

Oilseeds are a big business. The country is obliged to import over a million tonnes of vegetable oils every year at enormous cost in foreign exchange. The price of vegetable oils is to some extent determined by the level of imports and the effectiveness of the public dis-tribution system. The prices fluctuate violently and are invariably high as for example the price of coconut oil is over two times the level in other countries. There are a lot of regulations on distribution and trade but the pro-ducer gets little benefit and the trader invariably fattens on the price differentials. The oil cake byproduct is an export item of some value to the producer of oils from the seeds. One of the items which has made headway is cotton seed oil in recent years but additional benefits to the cotton grower are nil. As a sector of food proces-sing, the oilseeds/oils is important but one would expect this will not fall under the purview of the new Ministry.

There has been a Food Industries Directorate in DGTD even since the proper organisation of this Department. This directorate deals with multifarious pro-ducts -- flour mills, vegetable oils, milk byproducts, baby food, fruit juices and jams, soft drinks, starch and glu-cose, biscuits, bread, confectionary and so on. It has a very creditable record of activities and promotion of developments. It is indeed a great privilege that the industries handled by this Directorate is to be the responsibility of a whole new Ministry.

So far as food products are concerned there has been much progress in the past 2 or 3 decades. There is a spectacular increase in soft drinks as well as in beer (from barley). Maize is used as a source of starch and glucose though we do not have any conversion of this to ethyl alcohol. Tapioca or Cassava is also a source of starch and glucose. Cocoa beans are an important addition to our plantation crops and are processed to chocolate and cocoa butter. There is a big boost in the production of fruits particularly of apples and grapes which are extensively marketed as such or converted into juice concentrates or jams. Tomato products are made extensively besides other fruit juice products. The production and consumption of bread and biscuits have gone up manyfold and so also milk chocolates and food drinks. Milk powder production has gone up though the country depends on some gift supplies from Europe for economic reasons. Most recently rice preparations for frying have hit the headlines. This brief outline is only indicative of the progress already made by India to the area of food processing.

The question arises as to what an independent Ministry of Food Processing is meant to achieve. There has been a lot of controversy on the import of knowhow and brand-names for processed food products. One could say that the need for import of knowhow has not been of any critical importance and some approvals such as for example for ice-cream were aberrations.

The major controversey was on the import of special formula cola concentrates and the use of the brand names "Coca Cola" and "Pepsi Cola". The Pepsi Cola wound up operations soon after start up, but the Coca Cola tie-up flourished for some time until the Janata Government forced them to wind up. The country has not been in any trouble as a consequence. The induction of Coca Cola provided efficient distribution, standardisation and marketing expertise which have been of much value even if the secret formula is not. The Indian soft drink industry has fluorished on its own and even able to open bottling franchises outside India.

There is some controversy on processing of surplus potatoes. There is inadequate cold storage and some Indian varieties are said to be not readily processable to wafers or chips for which there is a reported export potential. Some technical knowhow import for potato wafers has been allowed. But some special effort by our very well organised Agricultural Universities and the IARI should certainly be able to provide the seeds and expertise for such an innocuous item as potato chips. Instant coffee has been a monopoly of Nestle's but here too there are signs of competition based on indigenous expertise. Chocolates and choco drinks are again a near monopoly of a foreign subsidiary but things are shaping up for Indian producers. So far as soft drinks are concerned India has also taken to the multilayer film cartons for which the machinery is imported and the composite films are also expected to be made in India soon.

We should certainly wish the new Ministry quick success in boosting food processing in the country through proper assistance and incentives and the harnessing of resources of the country. But one should provide a note of caution that the promise of better returns to the small farmers will be a mirage. Above all the creation of a Ministry of Food Processing should not lead to approval of technology tie-ups or investments in areas where they are totally unnecessary.

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INTERMEDIATE INPUTS :

Advance licensing scheme made easy

The Government has simplified the Intermediate Advance Licensing Scheme procedure.

Under the scheme, duty-free advance licences are granted to registered manufacturer-exporters for the supply of the intermediate product to an exporter holding a duty-free licence.

This scheme enables a manufacturer-exporter of an export product to obtain the supply of intermediate product to an exporter holding a duty-free licence. This scheme also enables a manufacturer-exporter to obtain the supply of intermediate inputs from the indigenous sources rather than to resort to direct import.

The scheme, which was limited to only a few specific products, has been expanded in the 1985-91 import-export policy to cover all items where the State operation can be undertaken jointly by two different manufacturing units.

However, the scheme provided for a joint bond for the fulfilment of the export obligation by the ultimate exporter and the intermediate manufacturer, and the final exporters were jointly and severally responsible for the exports. This procedure was found to be unworkable, and a number of representations were received in this regard.

The genuine difficulties faced by the intermediate manufacturers have been considered by the Government, and it has been decided that the bond/legal undertaking, will be executed separately by the intermediate manufacturer and the ultimate exporter.

The intermediate manufacturer will give the necessary bond/legal undertaking to cover the duty-free import for manufacture and the supply of the intermediate product to the ultimate exporter.

The ultimate exporter will give the bond/legal undertaking to cover direct imports and, subsequently, when the entire supplies are made by the intermediate manufacturer, he would be required to furnish additional bond, legal undertaking to cover the intermediate inputs.

The export obligation of the intermediate manufacturer would be treated as fulfilled once he has completed the supplies to the satisfaction of the ultimate exporter within the stipulated time.

With regard to the clearance of applications, power have been delegated to the Regional Advance Licensing Committee, while the Headquarter Advance Licensing Committee would clear other cases, as per the procedure outlined.

These changes are expected to give a boost to the utilisation of indigenous materials for export product and would result in higher value-addition, fuller utilisation of the industrial capacity and generation of employment potential.

Minister assures close watch on import liberalisation policy

Members of the Consultative Committee of Parliament attached to the Commerce Ministry have questioned the Government on the effectiveness of the import liberalisation introduced over the last few years since the country was still faced with a substantial trade gap.

Expressing concern over the possible impact of the measures on the domestic industry also, the members suggested that the Commerce Ministry undertake an evaluation of the impact on exports and on the indigenous industry of the earlier three-year import export policy (1985-88) and the current policy which is valid till 1991.

Responding to the suggestion, the new Commerce Minister, Mr. Dinesh Singh, assured the Committee that close monitoring of the policies would be undertaken in order to ensure that there was no adverse effect on the growth of the domestic industry and that distortions in the policy did not take place. The Minister explained that liberalisation was a conscious effort on the part of the Government to enable the industry to grow out of the sheltered environment and face international competition. This was a phase that many countries of the world had gone through, including the Soviet Union and China, he added.

Positive impact :

Justifying the liberalisation measures, the Minister said that the policy of allowing export units to have easy access to captial goods at competitive prices has had a positive impact in that the share of manufactured goods in the country's exports had increased from around 31 per cent in 1980 to 60 per cent in 1987-88.

Mr. Dinesh Singh informed the Committee that subsequent to the announcement of the import-export policy, a number of suggestions had been received from trade and industry proposing correction of anomalies and practical improvements. All these suggestions had been considered and where necessary, modifications announced. He pointed out that no formulation was good for all times as the international and domestic situation was constantly changing. The Ministry would, therefore, welcome suggestions on the modifications that might be needed from time to time to ensure fulfilment of the policy objectives.

Giving out statistics, Mr Singh said the export performance of Rs. 15,719 crores in 1987-88 had crossed the target for that year by nearly Rs. 2,000 crores. Still, he said there was need to keep imports down to the minimum so that the economy as a whole could derive the full benefit of the growth in export earnings.

Some of the members asked the Minister to make an assessment of the comparitive status of Indian exports vis-a-vis its main competitors in the light of the country's declining share in the world market for some commodities. It was also suggested that an assessment be made of the role of the Indian missions abroad in assisting export promotion.

FERTILISER PLANT

The Union Government is considering a proposal to set up a 1000-tonne per day fertiliser plant in Tripura with an estimated consumption potential of one million cubic metres of gas.

ONGC sources said the possibility of setting up a 200-tonne per day methanol plant based on natural gas was also being looked into.

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MANUFACTURE OF AMPICILLIN, 6-APA :

Study against tech import

An officially-sponsored study has concluded that there may not be a need for further import of technology for ampicillin and 6-APA "unless some radically improved technologies are available abroad."

At the same time it has stressed the need for improvement in indigeneous availability of the major raw material i.e., penicillin G-V, both in terms of quality and quantity.

The study has also called for development of immobilised enzyme technology in India. Similarly, steps should be taken to develop the indigeneous supply of D(-) alpha and phenyl glycine chloride hydrochloride. In addition to these technical imperatives, the study has also advocated reducing the price of indigeneous raw materials.

Study on ampicillin is one of the several status-reports on 15 sectors products that the National Register of Foreign Collaboration (NRFC,) an official scheme, got prepared recently by the expert organisations in the country.

These studies are aimed at critical analysis of imported technology and state of the art of technology in use in the country. The NRFC has already identified about 100 priority sectors/ products, including those in co-ordination with various departments and ministries at Delhi. These studies have been entrusted to organisations like IDBI, CEI, FIED etc.

The study on penicillin G-V states that both in terms of yield and recovery the Indian industry "is lagging far behind" its international counterpart. It has recommended induction of technology for improved strains of bacteria for production of penicillin G-V as well as for recovery of product from the fermented liquor. It has suggested that the import of high yielding strains should be followed up by vigorous R and D to further improve their productivity.

It has also called for modernisation of process instrumentation in this industry to achieve better economy in production costs, as well as improvement in quality.

Besides ampicillin and penicillin G-V, the NRFC-sponsored studies covered mopeds, dry cell batteries, diesel engines, pre-calcinators, DMT and polyester staple fibre, material handling equipment, refrigeration compressors, SF-6 circuit breakers, cooling towers, photocopiers, HDPE, foundry moulding machine and acetylene black.

These reports are used as one of the inputs to the technology absorption and adaptation scheme (TAAS) operated by the government which was introduced to improve the level of imported technology in use in the country. Its thrust is to support and promote measures towards absorption of imported technologies and adaptation of products and processes relevant to domestic requirements as well as for exports. It essentially aims towards providing catalytic support for accelerated absorption and adaptation of technologies by the industrial units. Nine projects have so far been approved for absorption exercises related to imported technology under this scheme.

The study on SF-6 circuit breakers points out that in order to develop know-how for basic design short circuit testing facilities for higher voltages should be made available freely. Advance action need be taken for development acquisition of technology for circuit breakers for HVDC lines and 800 KV AC voltage ratings.

On refrigeration compressors, it has been stated that since at present there "is virtually no tie-up between industry and research institutions," it urged closer relation between the two "for improvement in designs and performance." Selective imports of technology for certain critical components like valves, springs etc. as well as greater emphasis on development of manpower has also been emphasised in the report.

The study calls for adoption of plasma process for production of acetylene black. There was also the need for producing these items through petrochemical route to reduce the cost of production. The present production, it says, "does not match the requirements both of quality and quantities" and the industry should therefore improve its process control instrumentation and introduce micro-processor based controls to avoid variation in quality. The report also recommends that new letters of intent should be expedited to bridge the supply-demand gap.

The report pertaining to cooling towers suggests setting up a national facility for testing to generate basic thermal design data. It wants better utilisation of expertise in design and manufacture of fan blades available with institutions like National Aeronautics Limited and IITs.

MEG PRICES CLIMB FURTHER

Mono-Ethylene glycol (MEG) prices have skyrocketed to a new high of over US $ 1,700 per tonne in the international market from $ 1,200 to $ 1,300 prevailing about a fortnight ago and $ 990 ruling in May 1988.

MEG is one of the major ingredients for the manufacture of polyester and its price in the world market has already doubled today as compared with the price of $ 850 prevailing in March 1988.

With the increased demand within the country for PVC, HDPE etc which are ethylene-based products, the availability of MEG from indigenous sources has come down considerably. With the result that 90 per cent of the polyester industry's requirement of MEG has to be met through imports.

In the context of the extremely limited availability of MEG and spiralling prices, the government had favourably considered the polyester industry's plea and had reduced the import duty from 155 per cent to 90 per cent from May 2, 1988.

Even with this reduced import duty the increase in the cost of production of polyester is substantially higher due to further increase in the CIF price of the material. Due to erratic supply of MEG and dwindling stocks with the polyester units, some of the units have been compelled to resort to production cuts. The industry is seeking a further cut in import duty to the level of around 30 per cent, or to make it at a specific rate of Rs. 5,000 per tonne.

Supply crunch in benzene

Growth in benzene consumption by the chemical industry has tightened the screws on supplies and the Government may resort to imports if it becomes necessary, it is learnt. The current shortage, though not serious, is likely to continue until early 1989 when the benzene plant of Cochin Refineries is expected to be commissioned.

The 87,000 tpa Cochin plant is expected to achieve full capacity utilisation in three years. During its first year, it is expected to inject 10,000 to 15,000 tonnes into the market.

Only an year ago there was a surplus of benzene, prompting some manufacturers to think in terms of exports. Apart from the general growth of the chemical industry, the increased consumption is attributed to the new benzene-guzzling giants who stabilised their production this year. These include the linear alkyl benzene (LAB) plants of Reliance Industries Ltd (RIL) and Tamil Nadu Petroproducts Ltd. (TPL) and the phenol plant of Hindustan Organic Chemicals Ltd (HOC).

Meanwhile, the long-debated issue of supply of benzene and other naphtha derivatives of exporters at global prices has almost become a non-issue as the difference between international and Indian prices have considerably narrowed down. Nevertheless, one bulk consumer, HOC, is seeking import of benzene under the advance licensing system. HOC has gone in for massive export of phenol (around 1,000 tonnes every month) and is planning to add another product to its export basket — acetone.

Predicting consumption trends in petrochemicals is about as accurate as weather forecasting. If rumours that RIL and TPL may cut down LAB production in view of the drought-stricken detergent market are true, the benzene supply front will brighten again. Between them the two LAB producers consume more than 50,000 tonnes of benzene a year.

With Madras Refineries Ltd also planning to put up a benzene plant, the next few years should see a glut of the material if consumption growth does not keep pace. The new likely bulk consumers are Fertilizers and

tum project and the LAB projects of Nirma Chemicals and Hindustan Lever.

Benzene is sold at around Rs. 6,500 per kilolitre (ex-refinery). The major producers are Indian Oil Corporation whose 20-year-old Koyali plant produces 48,000 tpa and Bharat Petroleum Corporation Ltd. whose three-year-old plant in Bombay has a capacity of 98,000 tpa. Due to some problems, the actual production at the BPCL plant is said to be around 84,000 tonnes only. (BPCL officials were not available for comment).

Other producers include Indian Petrochemicals Corporation Ltd., which produces 35,000 tpa byproduct benzene about half of which goes into captive use. National Organic Chemicals Ltd (NOCIL) produces around 15,000 tonnes. Various steel plants produce around 26,000 tonnes as a byproduct.

NEW INDIAN STANDARDS

The Bureau of Indian Standards has published the following new and revised Indian Standards relating to the field of Chemicals.

IS: 247-1987 Sodium sulphite, anhydrous (fourth revision); Is: 3025 (Part 28)-1986 Methods of sampling and test (physical and chemical) for water and wastewater: Part 28 Sulphites (first revision); IS: 8121-1987 Chromed buff calf skin in wet-blue condition (first revision); IS: 1987-1986 Wax-emulsion for leather finishing; IS: 12042-1987 Method for determination of molybdenum by atomic absorption spectrophotometer; IS: 12084-1987 Morpholine; IS: 12085-1987 Cyclohexylamine for boiler water treatment; IS 12086-1987 Hydrazine hydrate; IS: 12121-1987 Sodium carbonate, anhydrous, photographic grade.

Copies of the Indian Standards are available from the Sales Services at BIS Headquarters at New Delhi and Regional and Branch Offices located at Bombay, Calcutta, Chandigarh, Madras, Ahmadabad, Bangalore, Bhopal, Bhubaneshwar, Guwahati, Hyderabad, Jaipur, Kanpur, Patna and Trivandrum.

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DRUG TRADE MARGIN :

Vengal Rao moots reference to Kelkar panel

The Union Industry Minister, Mr. J. Vengal Rao, has suggested to the drug industry representatives that the controversial trade margin issue can be once again, referred to the Kelkar Committee for finding a way-out of the present impasse.

The Industry Minister made this suggestion while meeting representatives of the Indian Drug Manufacturers Association (IDMA), the Organisation of Pharmaceutical Producers of India (OPPI) and the Pharmaceutical and Allied Manufacturers and Distribution Association (PAMDAL) in New Delhi on July 13th

The drug industry representatives submitted a memorandum to Mr. Vengal Rao suggesting therein early solution to the trade margin problem, adjustment of the maximum allowable post-manufacturing expenses (MAPE), norms for conversion costs, packing charges, price fixation and loan licensing system.

Mr. Vengal Rao said the issue can be reviewed by the Kelkar Committee in the light of the fresh developments that have taken place and the new points raised by the trade and industry.

The Minister reiterated that the Government would not like the consumers to suffer on account of the stands taken by the industry and trade. They are expected to ensure abundant availability of essential drugs to be produced with cost effective and new technologies.

The industry representatives told the Minister that they cannot raise the trade margin any more, as this will render their operations unviable. The burden of an increased trade margin cannot be supported by the industry, they said. This is more true for loss-making drug companies. While they agreed in principle to the trade's view that it should get a fair margin, its quantifications cannot be left to pressure tactics.

At a meeting with the drug industry representatives in New Delhi on July 12, the Government categorically turned down the industry's plea for excise duty rationalisation of facilitate payment of higher margins to wholesale and retail trade

With the Government's offer to set up a tripartite body to settle the trade margin issue already being spurned, it is now certain that the impasse on this issue can be removed only through the initative of the trade or industry. The Government will not intervene in this matter now.

The meeting was attended by the Secretary in the Department of Chemicals and Petrochemicals, Mr. H. K. Khan, and representatives of the Organisation of Pharmaceutical Producers of India, Indian Drugs Manufacturers' Association and another pharmaceutical producers' body.

The main subject of the meeting was the trade margin issue. The industry suggested that the Government can reduce excise duty on drugs and the financial benefits out of the duty cut can be used for paying higher margins to the trade as per its demand.

The industry representatives also argued that they cannot provide for higher trade margin from their existing profits, as there have been declined to 5.2 per cent of the turnover. Hence, the industry pleaded for excise duty reduction on drugs, the financial benefit of which can be used for paying out higher margins to the trade.

But the Department of Chemicals and Petrochemicals has rejected the plea on the ground that the Government would like to ensure that the benefit of an excise duty reduction should always be passed on to the consumer and not to any other sector.

The industry representatives were also told in no uncertain terms that it was their moral responsibility to arrive at a settlement with the trade on the margin issue. They should ensure that the consumers should not at any cost be inconvenienced as a result of their dispute.

The issue of fixation of prices for new drugs under the new DPCO was also discussed at the meeting. The industry referred to the delays in fixation of prices. The department clarified that the delay was caused by the industry's indecision in submitting applications for price revision in view of the controversy over trade margin.

As regards the scrapping of loan licensing system, the Department clarified that it would be scrapped by 1990. It has already sent its suggestions on this issue to the Health Ministry which would make necessary follow-up action.

The trade margin issue acquired controversial dimension as the new DPCO 1987 raised the margin from two per cent to three per cent for wholesale trade and from 10 per cent for over-the-counter (OTC) drugs without any prescription and 12 per cent for ethical drugs against prescription up to 15 per cent and 17 per cent, respectively.

The industry refused to part with such higher margins, just as the wholesale trade refused to accept a lower increase in its margin. A new formula was introduced in March 1988, as per which 16 per cent margin was for retail trade on all drugs and the wholesale trade margin was to be negotiated between the industry and the trade.

But even this could not settle the row. The Government offered to set up a tripartite body to resolve these issues. But the trade rejected the offer, thus putting an end to all hopes of an early settlement of the controversy.

EFFECTIVE MEANS TO WASTE DISPOSAL

Sludges, the moist wastes of sewage treatment, food processing, and the pharmaceutical industry, along with animal manures, plant debris, and other agricultural wastes, are becoming a major disposal problem worldwide. Incinerating them is costly and threatens air quality; dumping them likely to pollute ground water.

Increasingly, composting is seen as the most effective, economical and environmentally acceptable way to treat these wastes. It does this by converting the highly contaminating raw wastes into a stable humus, one-quarter to one-half of the volume of the original waste.

Because the finished compost is so stable, it releases its nutrients at a rate controlled by soil temperature and plant needs. As a result, water-soluble nutrients are never in excess.

Nalco will produce aluminium in full steam

The production of molten metal in the first pot line at the Orissa-based National Aluminium Co. Ltd. (NALCO) — India's largest primary aluminium producer — has now been re-established.

It may be recalled that this pot line, with 194 of the 240 pots already commissioned, had gone out of control in April this year, forcing the management to shut down production from 64 pots.

The Chairman and Managing Director of NALCO, Mr. Pantulu, said at Bangalore that the erratic behaviour was essentially because of the inability of the pot line staff to keep up to the rigid and very demanding operational schedule dictated by the new technology.

Perhaps the pace set for the commissioning of the pots — nearly one a day — was too nigh for the inexperienced pot room staff. It was on the recommendation of the technical collaborators — M/s. Pechiney of France — that a cutback was ordered on the number of working pots.

The strategy worked and the pot room operations have been streamlined in the past two months with productivity per pot reaching 1.30 tonnes of metal a day against the project report figure of 1.26 tonnes a day. The quality of the metal is also excellent with consistent purity levels of 99.7 to 99.8 being achieved.

The management has given the green signal for recommissioning the 64 shut-down pots and commissioning the remaining pots in the line. It is expected that the entire line of 240 pots will be in operation by April next.

Baseless stories :

Stating as baseless the stories in some sections of the press about some pots being irreparably damaged, Mr. Pantulu said that no pot had even suffered damage to its carbon lining. Some anodes had to be prematurely scrapped and sent for carbon recovery.

But NALCO had definitely suffered a setback in production because of the trouble. Against a targetted output of 1.30 lakh tonnes of aluminium and an expected production of one lakh tonnes, the actual output this year (1988-89) would be around 80,000 tonnes.

The gap in metal output during the last three months, when the pot line was being reestablished, had created an aluminium scarcity in the Indian market leading to a premium on its price.

Meanwhile, the alumina plant of NALCO is working well and this year the company hopes to turn out 5.50 lakh tonnes of alumina, against a production of 1.67 lakh tonnes last year. The total capacity of the plant is eight lakh tonnes a year. NALCO expects to earn Rs. 100 crores in foreign exchange from the export of alumina this year as against Rs. 15 crores last year.

NALCO will be generating a gross revenue of Rs. 350 crores to Rs. 400 crores in 1988-89 against Rs. 135 crores last year. According to Mr. Pantulu, the reports of Rs. 3,000 crores as the total capital cost of the project was exaggerated. He said a capital outlay of around Rs. 2,400 crores would be enough. With the price of alumina firming up in the international market, NALCO's viability will be much better than what has been projected by the press so far.

'NO MOVE TO SHUT DOWN BALCO'

"The question of closing down the aluminium plant of the Bharat Aluminium Corporation Limited (Balco) at Korba, Madhya Pradesh, does not arise, National Aluminium Company Limited (Nalco) chairman and managing director K.V.V. Pantulu said in Bangalore on July 12th.

Addressing a press conference organised by the Aluminium Association of India, Mr. Pantulu stated that Nalco and other aluminium manufacturers would be only too ready to chip in with their share of bauxite or alumina to ease the current difficulties being faced by Balco.

Balco chairman and managing director P.S. Rao noted that the company would be able to pull on for another one and a half years on the strength of the bauxite deposits in the existing mines. "We are scrapping out a little here and there."

Mr. Rao stated that to resolve the current stalemate in getting environmental clearance to exploit the bauxite deposits at Gandhamardhan in Orissa (the alternative source of raw material), Balco was pursuing the matter at the highest levels.

The company was also approaching the Orissa chief minister to convince him of the benefits of commercial and economic exploitation of this mineral wealth.

CENTRAL POLLUTION CONTROL BOARD IN CALCUTTA

One inauguration of the Central Board's Regional Referral Laboratory in Calcutta at 247 Deshpran Sasmal Road, Tollygunge C.I.T. market, Calcutta 700 003 was held on June 24th, 1988.

Prof. N. Mazumder, Former Director, National Environmental Engineering Research Institute presided over the function. Dr. Ambarish Mukherjee, Honourable Minister for Environment and Forests, Government of West Bengal inaugurated the Regional Referral Laboratory of the Central Board.

Members of the Central Board were present.

The laboratory would serve as the referral laboratory of eastern region and for major direct pollution monitoring activities in the area. It is specially equipped to measure micropollutants in air, soil, water and marine waters. It has the capability to determine about 100,000 parameters a year including organic and heavy metal micropollutants.

History of Build-up of the Laboratory

The laboratory is equipped with sophisticated instruments provided under the Indo-FRG bilateral assistance programme. In 1984 a team from West Germany visited India and identified four places where regional laboratories could be set up. These are Ahmedabad, Bangalore, Calcutta and Delhi. After signing of an agreement on this between the Governments of FRG and India, assistance from FRG followed in the forms of instruments and training. The laboratory which is being inaugurated today is the outcome of this programme.

Future

The laboratory at Calcutta will play a key role in marine water monitoring in the eastern coast. The Department of Ocean Development has proposed to entrust to this laboratory the responsibility of monitoring near and off-shore water quality for the entire east coast. The laboratory will be involved in training the scientists of the State Pollution Control Boards and in conducting analytical quality control.

ALCOHOL FROM PLANT STARCH :

RRL scientists develop new method

A new method for continuous production of alcohol from a plant starch using immobilised yeast cells has been developed by scientists, who say the process could revolutionise India's alcohol industry.

Traditionally, ethanol or ethyl alcohol is produced from molasses, a by-product of the sugar industry.

But of late, the molasses-based distilleries have been facing difficulty because of shortage of molasses.

Scientists at the Regional Research Laboratory (RRL) in Trivandrum have shown that ethanol can be continously produced from cassava plant starch in a reactor filled with immobilised yeast cells.

RRL scientists successfully operated for three months a ten-litre capacity "fermentation bioreactor" producing ethanol to prove the low-cost of the technology.

Based on its success, a sixty-litre bioreactor will now be set up by RRL in collaboration with the Vikram Sarabhai Space Centre, under a Rs. 8-lakh project approved by the Department of Non-Conventional Energy Sources.

"The concept of cell immobilisation represents a novel approach to fermentation using alternative sources like cassava plant starch," says Dr. P. Prema, a scientist at RRL.

According to RRL Director, Dr. A.D. Damodaran, the new method has attracted the attention of major alcohol manufacturers who wished to see the performance of the scale-up reactor before they decided on the technology to be adopted in their distilleries.

The scientists picked on cassava as it is one of the most efficient photosynthesising' plants, having a carbohydrate content of 90 per cent.

The process involves converting the plant starch into glucose, which are treated with yeast cells to produce ethanol.

Cassava tuber grows mainly in Andhra Pradesh, Karnataka, Kerala, Meghalaya and Tamil Nadu and the total production in India is put at five million tonnes.

Kerala alone accounts for the production of 3.5 million tonnes.

According to RRL scientists, alcohol from cassava is economically feasible and a process showed that 100 kg of cassava flour yielded 44.2 litres of alcohol.

The scientists, however, admit that manufacture of alcohol from cassava involves additional cost to cover initial 'saccharification' of starch unlike in the case of molasses.

"This can be reduced by utilising wastes and residues as an energy sources to counterbalance the cost," Dr. Prema says.

Improved cassava cultivation practices and enzyme systems for its hydrolysis can reduce the cost of alcohol from cassava significantly in the coming years.

It is raw material cost that makes up the major portion of final alcohol cost and the selection of a raw material is central to the economics of any new alcohol plant, the scientits say.

MOLASSES, ALCOHOL STOCKS WORRY SUGAR INDUSTRY

Accumulation of molasses and alcohol is causing great concern to the sugar industry which is poised to produce a record 92 lakh tonnes of sugar during the current season.

Mr. Shivajirao Patil, chairman, Maharashtra Rajya Sahakri Sakhar Karkhana Sangh, has therefore urged the Union government to ensure an adequate outlet for the disposal of accumulated stocks in the state.

He said the sugar industry in Maharashtra was saddled with nearly five lakh tonnes of molasses, while it was alloted an export quota of only one lakh tonnes. The state is similarly nursing huge stocks of alcohol for which it was finding difficult to obtain an outlet.

Mr. Patil said the situation was expected to worsen with a sustained increase in sugar production which is expected to reach a level of 120 lakh tonnes by the end of Seventh Plan. By the end of the Eighth Plan Maharashtra alone will produce about 45 lakh tonnes of sugar which would generate still more molasses and alcohol.

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IDL chemicals' project cleared

Medak district in Andhra Pradesh ll soon have a Rs. 300-lakh plant ing promoted by the Modella In- strial house.

The proposed project to be imple- ented by IDL Chemicals Limited the group will manufacture 50 a of ethyl vanillin and 150 tpa of nillin.

The project has been approved by e Centre despite objections from vo existing companies in the field the ground that sufficient capa- ty had already been created. Ano- er objection from them — Arlabs imited and Vanillin and Fine Che- icals Limited — was that IDL will e using outdated obsolete process ith huge investment which in their pinion "will not be able to provide ie end-products at "commercial rices."

However, both these objectors did ot turn up when oral hearing be- an. Instead they urged the govern- ment to take into account their written objections. The government declined their pleas since the request for postponement of the hearing was made only on the date of hearing.

IDL's argument was that it was making a fresh bid, that too in a backward district. The proposed items did not involve any foreign exchange outgo. The company has developed the technology for the items proposed through its own R and D efforts.

It also countered Vanillin's objection saying that IDL was not borrowing technology from anyone. The technology was already a well-known one and is contained in published documents.

Another reason for IDL entering the field was that the demand was likely to go up in the near future and the capacity so far approved by the government was only 160 tpa for vanillin and 15 tpa for ethyl vanillin. There will be a wide gap between demand and supply.

After hearing the arguments and objection the Centre approved the project taking into consideration these aspects. — (a) IDL was going to a backward area; (b) there is no foreign collaboration involving outgo of foreign currency; (c) import of raw material will be only Rs. 3.16 lakhs annually; (d) though capacity had already been approved including the one received by one of the objectors "no satisfactory progress has been made by the units and there is enough gap in demand and supply to create additional capacity."

The government, while approving the project, told IDL that the entire project cost of Rs. 300 lakhs will have to be met by internal resources and that it shall take adequate steps to combat pollution hazards. It shall also have to take adequate safety measures to the satisfaction of governmental authorities.

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TN FLUORINE AND ALLIED CHEMICALS

Revised costs plan of 2 projects okayed

The Central government has agreed to the joint-sector Tamil Nadu Fluorine and Allied Chemical Limited's proposal for the revised costs of its two projects, coming up at Cuddalore. These projects are for (A) the manufacture of miscellaneous fluorine-based chemicals and (B) cryolite.

The government approved in September/October 1986 the company's proposals for the manufacture of certain miscellaneous fluorine-based chemicals for a capacity of 1000 tonnes per annum within the existing capacity of 7,500 tonnes per annum of aluminium fluoride at an estimated cost of Rs. 200 lakhs.

In the second original order, the company was permitted to manufacture 3000 TPA of cryolite within the existing capacity of 7500 TPA at a cost of Rs. 452 lakhs.

Both these additional manufacturing will be done at the company's existing plant at Cuddalore in south Arcot district.

In the revised proposals, the company sought the government's green signal for reducing the project costs from Rs. 200 lakhs to Rs. 57.95 lakhs in the case of miscellaneous fluorine-based chemicals and from Rs. 542 lakhs to Rs. 104.65 lakhs in the case of cryolite. The company justified these reductions on the ground that it had now excluded the cost of HP liquefaction scheme in both the projects obviating the need for additional funds. The government has accepted the argument and given its green signal to both the revisions.

For the former project (revised cost of Rs. 57.95 lakhs) the company intends issuing (right share) equity capital to the tune of Rs. 22.60 lakhs (against the original plan of Rs. 60 lakhs) and acquire rupee loans from financial institutions of Rs. 35.35 lakhs (instead of Rs. 140 lakhs).

In the case of cryolite project, the company will be issuing right equity issue for Rs. 40.82 lakhs (as against the original outlay of Rs. 130 lakhs) and Rs. 63.83 lakhs loans from financial institutions (against the original plan of Rs. 322 lakhs).

SPECIALITY CHEMICALS COMING TO INDIA

Speciality Chemical Consultant, Inc., a Milwaukee (US) based company, has decided to branch out to India with an objective of arranging the transfer of innovative technologies in the field of speciality chemicals and consumer-related industries.

The spectrum of speciality chemicals, according to Mr. Hem Vakharia, the President of the Indian division, would cover industries, like metal finishing/treatment, coatings, printed circuit boards, metal working, water treatment, automotive after-market while the consumer related activities would cover hard ware items, like small household gadgets and chemicals used for household applications.

Mr. Vakharia said in a press release that the company would provide services like product research and development, technology know-how, including formulations, patent search, manufacturing and quality control processes/procedures as well as sales and marketing, trouble shooting for cliente's problems pertaining to product applications, etc.

The company has established a division specialising in exploring licensing opportunities from American, European and Japanese firms to the third world nations.

The company has engendered interest among a few American firms as also a number of NRIs to explore business opportunities in India either by financial involvement or through technology transfers. The company also recognises that there is an immense scope of boosting Indo-US trade. Many companies in India and the U.S. lack marketing riches/set-ups or intelligenc and this creates a performance gap. SCC would bridge this gap.

SEARLE'S BUTACHLOR PLANT ON STREAM

The 1,000-tonnes capacity plant of Searle (India) for the manufacture of butachlor technical at Ankleshwar in Gujarat has commenced production with the release of first batch of this material recently, according to a company press release at Bombay on July 4.

The quality of butachlor technical being produced by the Ankleshwar plant is comparable to the imported ones, claimed the release.

Presently, the entire needs of this material, around 2,000 tonnes annually, is imported.

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Modis MCA project cleared

Modis have finally won governent's approval for putting up a ew unit in Alwar, Rajasthan for ne manufacture of monochloro ace- c acid (MCA).

The project was delayed follow- g objections from several compa- ies against the unit being floated y the monopoly house.

Overruling the objections, the entral government said it was in ublic interest to accord approval o the Rs. 180 lakh project, to be im- lemented by the Modi Alkalies and hemicals Limited the project is for anufacturing 2000 tpa of mono- hloro acetic acid (MCA).

At least eight companies from va- ious centres opposed the project rguing "the demand was static for he last three years" and that if the emand rose in future the existing nits, largely in the small-scale or- anised sector, could meet the same n view of the fact that their capa- ities are under-utilised.

One of the objector companies Gujchem Distillers India limited ointed out that its capacity utilisa- ion was only about 55 per cent. Production, as a parameter of de- nand suggested that there was no eed for creation of additional ca- acity.

Another objection was that there was no need for foreign collabora- ion for the project since technology was available within the country.

Ashok Organic Industries, also bjected on the grounds that it was already supplying the item all over India despite the fact its capacity utilisation was only 50 per cent. There was difficulty in procuring chlorine. Besides the cost of project varied between Rs. 10 lakhs and Rs. two crores. Therefore the proposed estimates of Rs. 80 lakhs need to be examined.

Refuting these and other objec- tions, Modis argued that their acti- vity will be in the Matsya Industrial area in Alwar. The main raw mate- rial, chlorine, was available from their existing caustic soda plant and the proposed project was to utilise the surplus chlorine available with the company. MCA is to be used as an intermediate in the manufacture of carboxy methyl cellulose, 2,4-D herbicide, EDTA and nitrilo acetic acid. It is also consumed by the dyes and pesticides industry.

It was further argued as against the demand of 8000 tpa the MCA production had been only about 5300 tpa, thus there was a sufficient gap in supply-demand.

The demand for MCA was sure to increase because of increase in demand for MCA-based chemicals — herbicides etc. Besides there may even be export-feasibility.

The under-utilisation of capacity by the existing units stated the Modis, was more due to "inadequate technology" than demand constraint.

Since the RRL at Hyderabad expressed its inability to provide suitable technology the Modis were for obtaining foreign technology. At the same time they have left it to the government to decide if there was the need for collaboration.

Another rebuttal advanced by the Modis was that enough chlorine was available with them at their existing plant which would enable the company to obtain it without any transport bottleneck or hazards.

After hearing both the parties, the government stated that the MCA was not reserved for public sector/ SSIs and was open for MRTP companies. Since the company was already operating a plant at Alwar manufacturing caustic soda, chlorine, hydrochloric acid, bleaching powder and calcium hypochloride, it would be gainful utilisation of its surplus chlorine if the new project was also permitted to be operated.

The project cost of Rs. 180 lakhs will be met by: equity Rs. 60 lakhs (company contribution Rs. 36 lakhs and public issue Rs. 24 lakhs) and the balance Rs. 120 lakhs will be from FIs as loans.

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Koluthara to launch decarboniser

The Ernakulam-based Koluthara group will be launching in Bangalore on July 10 a decarboniser which can reduce the presence of carbon monoxide and hydro-carbons in vehicle-emission to much below the permissible levels specified by pollution control boards, the chief executive of the group, Mr. Sebastian Koluthura, said at Bangalore on July 8th.

He told newsmen that preliminary tests conducted by the Karnataka Pollution Control Board (in Bangalore on June 27), by the Kerala Pollution Control Board (in Trivandrum in the first week of June) and by the defence ministry's Vehicle Research Development Establishment (VRDE), Ahmednagar, had proved that the product had reduced the presence of carbon monoxide and hydro-carbons in emissions to below the permissible limits prescribed for all classes of vehicles.

The product, he added also helps to minimise fuel consumption by improving engine-performance and ensuring that compression became better. "The product is simple to use and requires only five minutes for application, thereby eliminating the botheration and reducing the time required for decarbonising engines as per the present practice followed by workshops," he claimed.

Mr. Koluthara stated that the product had been developed indigenously after extensive research and incorporated a technology which was particularly appropriate for Indian conditions where vehicles had to make do with fuel which was not 100-percent lead-free.

The product, he said, had just been launched in Trivandrum. While a number of orders had been received from individual transporters, discussions were also going on with the state road transport corporations (SRTCs) of Kerala and Karnataka. These SRTCs had an extended warranty with vehicle manufacturers like Leylands and Telco. His company was now approaching these manufacturers so that they could check the efficacy of the product and recommend its incorporation in service schedules.

Mr. Koluthara expected sales of second year and Rs. 100 lakhs in the third year. The group, which was essentially involved in the trading of automotive products, had achieved a turnover of Rs. 45 crores in 1987, he said.

PLASTIC INDUSTRY IN DEEP TROUBLE—FURTHR EXPLOTED BY INDIGENOUS POLYMER MANUFACTURERS

Shri Kirit M. Mehta, Vice-President, AIPMA has issued the following statement to the Press:

Plastic processing units fear another dose of uncalled for price increase by Indian Petrochemical units supplying moulding resins which will deal crippling blows shortly. Indian manufacturers of polymer resins insulated from international markets by ridiculously high import duties persistently revise their price looking to world shortages of commodity plastics.

Small scale plastic units already reeling under burden of high duties and spiralling international prices of resins are put to severe hardship and incovenience. Repeated price increase for PVC, HDPE & LDPE by Indian polymer manufacturers clearly indicates their total disregard for hapless consumers who have no alternative but to accept the revision in rates. Under the circumstances, the only alternative for the survival and healthy growth of small scale plastic industry is the immediate drastic reduction in the import duty by the Government.

HDPE SACK UNITS SEEK BETTER DEAL

The Plastic-Woven Sacks Manufacturers' Association has said the recent changes announced by the Government would affect the HDPE woven sack industry more severely than the earlier ones.

In a press statement, the president of the Association, Mr. M.S. Agarwal, said the changes would destroy even that little market the plastic woven sacks had. The capacity utilisation of the industry had come down to as low as 25 per cent.

This would compel most of the

Appealing to the Government to take a sympathetic view towards the woven sack industry, Mr. Agarwal said a realistic approach should be taken so that the plastic woven industry and the jute industry co-existed.

Mr. Agarwal deplored the Government's new reservation quota of 100 per cent packaging of urea in jute bags. Urea alone accounted for nearly 70 per cent out of the total fertiliser production.

Exempting mini-cememnt plants with a production capacity of not more than 100 tonnes per day from the jute reservation order was of little significance since most of the mini-cement plants had this relief. It is merely an eye-wash. Permitting cement plants located beyond 1200 k.m. from Calcutta to pack cement upto 65 per cent instead of 75 per cent is also of little significance as many cement plants in the country were located within shorter distances, he added.

IDMA HEADING TOWARDS CRISIS AGAIN

Indian Drug Manufacturers Association (IDMA) appears to be heading for a serious crisis again as four office bearers of the association the vice-president, general secretary, joint secretary and treasurer tendered their resignations to the president, Mr. Vinobhai Shah, according to informed sources:

The sources said that all the remaining office bearers would also be submitting their resignations to the association president shortly.

This development is a sequel to the serious difference of opinion between most of the committee members and the president on various issues relating to the drug industry and organisational matters.

The crisis which had started in April last with the controversial letter of IDMA president to the ministry of chemicals and petrochemicals on in-house testing facilities in the drug industry has already discouraged many active members from participating in the affairs of the association in the recent weeks.

Mr. Shah was elected new president of IDMA at the last annual general meeting of the association after a keen contest in which Mr.

Single crystal super conductors developed at TIFR

A joint team of physicists in Bombay have synthesised India's first single crystal samples of a bismuth-based high temperature super conductor.

The team from the Tata Institute of Fundamental Research (TIFR) and the Indian Institute of Technology (IIT) in Bombay, reported the fabrication of the single crystals at the international symposium on high temperature superconductivity in Jaipur recently.

The single crystal superconducting compound the IIT-TIFR team made is a complex metal oxide of bismuth, strontium, calcium and copper which superconducts-loses all resistance to electric current-at minus 197 degrees celsius.

Scientists believe research on single crystals will lead to the development of ultrafast superconducting switches that could replace transistors in present-day computers and make them work up to 10 times faster.

Another potential use of single crystal research is in the construction of super-conducting devices called 'squids' which function as detectors for extremely weak magnetic fields and have applications in health, mainly diagnostics, and in oil and mineral prospecting.

The development of new high temperature superconducting single crystals has been reported so far only by a few groups in the world. Physicists attending the Jaipur symposium that concluded on Friday said homing onto the right fabrication process is not easy.

The bisumth-based superconducting single crystals were developed by Pragati Mukopadhya of the IIT centre for advanced research in electronics and M.S. Multani of the TIFR material sciences group. The team now intends to improve the quality of the crystals, said TIFR-research scholar, Prasenjit Guptasarma, who presented the work in Jaipur.

Scientists believe the study of single crystals will also lead to a better insight into the mechanism underlying high temperature superconductivity, a phenomenon, discovered two years ago but which has so far defied a good explanation.

The superconducting single crystals of bismuth and copper with carbonates of strontium and calcium to 900 degrees celsius and then cooling them gradually.

INSECTICIDES ACT REGISTRATION UNDER SEC. 9(4) STOPPED

The registration committee of the Central Insecticides Board has abruptly stopped granting of the second registration under Section 9(4) of the Insecticides Act, 1968, for the same product, it is learnt.

Hitherto, once a new insecticide was registered under Section 9(3) B of the Act, anyone, else could also get a registration easily for the same product under Section 9(4). The provision, thus, had deprived the original registrant of the benefit of protection totally.

According to informed sources, this provision in the Act has, in effect, discouraged companies and agencies engaged in research and development of pesticides to introduce new products in the Indian market.

There was also an impression in the government circles that the Section 9(4) of the Act was responsible for very few introductions of improved pesticides in the country during the last several years.

The government's decision now to stop registration under Section 9(4) appears to be the result of this impression and representations made by the original registrant of pesticides seeking protection for a certain period.

The government's decision has baffled a section of pesticides industry. Hundreds of applications are pending for registration under Section 9(4) with the board.

The sources point out that the decision of the board would help the existing manufacturers of basic pesticides to substantially expand their capacities without the fear of any new entrants in the field.

A section of the pesticide formulators think that total stoppage of lead to formation of cartels among the existing manufacturers of pesticides leading to higher prices and scarcity.

CADL OFFICE-BEARERS

At the 32nd Annual General Meeting of the Chemicals & Alkali Distributors Ltd. held on 25th June 1988, the Chairman Shri K.T. Sanghvi in his speech informed the members that Shri Pravin V. Sheth and his group of companies had taken over the management of the Company since 15th June 88. He told the members that the changeover was carried in a very smooth and cordial manner. Consequent to the change, Shri A.A. Mehta, Shri J. D. and Shri L. N. Gandhi-Directors resigned from the Board and the following persons were appointed as Directors :—

Shri Pravin V. Sheth, Shri Sudhir V. Sheth, Smt. Vilina P. Sheth, Shri Kantilal Underkat, Shri Divyakant C. Mehta, Shri P.S. Krishna.

The above Directors were re-appointed at the Annual General Meeting.

The Chairman further informed the Board that the new management had a number of projects in hand and that the Company would soon make progress under the new management. The Company which has glorious past will scale new peaks and is likely to offer its shares to the public at an appropriate time

The reconstituted present Board of Directors of the Company is as follows :—

Chairman :

Shri K.T. Sanghavi. Merchant.

Directors :

Shri J.D. Mehta, Industrialist; Shri S.K. Joshi, President, Chemical & Alkali Merchants' Association; Shri Pravin V. Sheth, Chartered Accountant & Director of Bharat Pipes & Fittings Ltd. and of group of Companies and Director on the local Board of Citi Bank; Shri Sudhir V. Sheth, Managing Director, Bharat Pipes & Fittings Ltd. and of allied Companies; Smt. Vilina P. Sheth, Director, Bharat Pipes & Fittings Ltd.; Shri Kantilal Underkat, Solicitor; Shri Divyakant C. Mehta, Advocate; Shri Bhavesh P. Sheth, Chartered Accountant; Shri P.S. Krishnan, Business Executive &

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Pesticide formulators urged to set up testing laboratories

Dr. M.L. Saini, Secretary Central Insecticides Board, Faridabad urged the small scale pesticide formulators in the country to join hands in setting up testing laboratories. Dr. Saini was addressing the Annual General Meeting of the Pesticide Formulators Association of India (SSI), in Bombay on July 8, 1988.

Dr. Saini requested the members who represented a wide crossection of the nations pesticide formulators to ensure the highest standards in their formulations. For this, Dr. Saini felt, proper use of machinery for making formulations was necessary. Quality control laboratories played a vital role in maintaining the standards of pesticide formulations, and he urged the association to lake the lead in setting up a testing laboratory which members could use. This he felt was necessary, as most of the formulators could not afford a testing laboratory of their own.

Dr. Saini also called for more work on the newer formulations which were more target specific and powerful. The Central Insecticide Board he added, would give all the assistance required to see that such formulations received registration.

India now produces close to 55,000 mt of technical grade pesticides per annum but pesticide usage at 297 gm/hectare is still low as compared to usage in developed countries.

A technical session in which two papers were presented was held later. The following are the synopsis as the papers presented.

CONTROLLED RELEASE PESTICIDE FORMULATIONS : AN OVERVIEW

DR. N. AMARNATH
National Chemical Laboratory, Pune

Pest control costs are tremendous and are bearable by only a few prosperous nations. Even so the increasing tolerance of many pest species to chemical agents results not only in the increased substitution of more toxic materials for pest control, but also in the use of greater amounts of selected agent for a specific control application. The success of pesticide depends to a large extent on the formulation and the conditions under which it is brought into contact with the target. Since both the nature of the target organisms and the chemical structure of toxicants vary widely, it is necessary to produce a large number of formulations. Pesticide formulation science is a very broad field because it deals with formulation development, production and storage. Pesticide formulations can be classified into various types of which CR pesticides is of significant interest.

AQUEOUS PESTICIDE FLOWABLE AND CONTROLLED RELEASE FORMULATIONS : PROBLEMS AND PROSPECTS IN INDIAN CONTEXT

Dr. P.N. PARTHASARATHY, RRL., HYDERABAD

Chemical pollution of our environment is a major concern today and rightly so, because of the dangers that threaten the healthy existence of man. Of all the pollutants, it is the pesticides that have become the primary target of grave criticism rightly or wrongly, in spite of the larger benefits—be it in crop protection or public health programmes. However, Pesticide Chemists are alert to such problems of environmental pollution and have been continuously making efforts to minimise if not altogether eliminate the necessary evil.

Formulation of pesticides as aqueous flowables and controlled release systems is one such profitable activity geared up in the right direction. Aqueous flowable formulations restrict or even altogether eliminate the use of costly, phytotoxic and environmentally hazardous organic solvents (invariably used in conventional formulations). These formulations are safer and biologically more effective. Controlled release formulations facilitate reduced dosage & effect steady activity over extended periods of time, meaning better performance, lesser cost and safer environment.

The talk centres round the science and technology of aqueous pesticide flowables and controlled release formulations, the main focus being on technological aspects. The relevant physico-chemical processes/ parameters vis-a-vis characteristics of the formulation components are discussed A state-of-the-art review of the subject is also being attempted, highlighting the problems and prospects associated with the novel pesticide formulations in Indian context.

Mr. V.P. Vashi, an eminent advocate presented a talk on the Implementation of the Insecticides act in Andhra Pradesh.

INTERFACE STRENGTH IN HIGH PERFORMANCE COMPOSITES

The Bombay Chapters of the Association of Chemical Technologists, India and the Society of Plastic Engineers, Inc. Jointly organized a lecture by Dr. A.N. Netravali, Assistant Professor in the Department of Textiles and Apparel at the Cornell University, New York, U.S.A. Dr. Netravali specializes in the field of Textile Technology as well as Fibre and Polymer Science. He is actively engaged in research, mainly in the field of polymer science.

The lecture by Dr. Netravali was held at U.D.C.T. on 10th June 1988 and the topic of his talk was 'Interface Strength in High Performance Composites".

Dr. Netravali's lecture was well prepared and with the help of transperancies he made it very attractive and gripping. The audience was from different disciplines such as polymer science, plastic engineering, textile technology, both from industries and from educational and research institutes. The lecture was presided by Mr. M.D. Dixit, eminent Textile Chemist from BTRA, Bombay.

While presenting his lecture, Dr. Netravali highlighted upon the use of fibre-reinforced polymeric composites which is expanding rapidly due to their high strength, high modulus, light weight and tailorability to meet precise engineering specifications. The tensile properties of the composites are governed by the fibre-matrix interface. Failure of interface of carbon fibre-epoxy system was studied by single fibre-composite technique. Different epoxy blends were used which had varied stiffness properties. Sophisticated techniques to study the failure of interface of these fibre-matrix composites were used, such as scanning electron microscopy, acoustic emission technique, micro-indentation technique, etc. It was concluded by Dr. Netravali from his observations that conventional fibre strength and the bulk resin properties cannot give any idea about the interfacial strength, but the local fibre-matrix interaction on a micro-scale decides the strength of such a composite.

Fertilizer stocks at record high

The fertilizer stocks in the country touched a record level of 3.46 million tonnes valued at Rs. 825 crores at the end of 1987-88. The stocks with the fertilizer industry have been growing since 1985 because of the long periods of drought in various part of the country. The indigenous stock of nitrogenous and phosphatic fertilizers as on April 1, 1988 was higher by 384 per cent compared to stocks on April 1, 1984.

According to Mr. J. L. Thakkar, chairman of Fertilizer Association of India (western region), last year turned out to be unfavourable as many parts of the country received much less rainfall resulting in drought situation. As a result the consumption of fertilizer was 89.96 lakh tonnes of nitrogen, phosphate and potash during the rabi season reflecting only a 2.9 per cent growth over the previous year.

Nutrientwise consumption of phosphatic fertilizers recorded a growth rate of 9.5 per cent, followed by a growth rate of 9.2 per cent in potash over the previous year whereas the consumption of nitrogenous fertilisers declined by 0.4 per cent over the previous year.

The consumption of fertilizers in the western region during last year was 16.65 lakh tonnes of nitrogen, phosphate and potash registering a growth rate of 7 per cent over the previous year. Mr. Thakkar said that the total fertilizer production in 1987-88 accounted for 54.67 lakh tonnes of nitrogenous fertilizers and 16.65 lakh tonnes of phosphatic fertilizers. The average capacity utilisation of nitrogenous fertilizers was 78 per cent and that of phosphatic fertilizers was 81 enous fertilizers was 78 per cent and 81 per cent respectively during the previous year.

The main reasons for the low production were shortage of imported phosphoric acid, power cuts and marketing constraints. Mr. Thakkar suggested that the government should have a dialogue with the fertilizer industry to explore the possibilities of fully utilising indigenous rock-phosphate for making phosphoric acid.

Currently India imports 8 lakh tonnes of phosphoric acid every year at a cost of about Rs. 65 crores for the fertilizer industry. And often the import of this acid is irregular because of many reasons.

MR. KISHORE V. MARIWALA

Mr. Kishore V. Mariwala, Director, The Bombay Oil Industries (P) Ltd has been elected Regional Chairman (Western Region) of Indian Chemical Manufacturers Association for the current year.

Mr. Mariwala holds a master's degree in Chemical Engineering and has extensive experience in the oleochemicals and botanical extracts businesses. He is associated with a number of professional, educational and sports institutions.

Mr. K. V. Mariwala.

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Phosphatic fertilizer prices may go up

The fertiliser industry apprehends a ise in the price of phosphatic ferti- isers because of escalating prices of mported phosphoric acid. Sixtyfour per cent of the country's P205 capa- city is based on imported acid.

Phosphoric acid, processed from rock phosphate deposits, is now quo- ted around $ 435 a tonne in the inter- national market. The major producers, other than the US, are West Asian countries like Morocco, Algeria and Tunis.

India has abundant deposits of low grade phosphate but facilities for con- version are inadequate. Annual imports exceed one million tonnes.

The international fertiliser market has also been firming up of late. Mr. J.L. Thakkar, the outgoing chairman of Fertiliser Association of India (FAI), western region who attended the In- ternational Fertiliser Association con- ference in France last month, attribu- ted this trend to the rising prices of basic feed-stock like naphtha and gas.

Detailing the progress of the monsoon in the western region, Mr. Thakkar said good rains have contributed to cent per cent sowing in eastern Madhya Pra- desh.

Inclusive of the pooled material, the total stocks of fertilisers amounted to 3.46 million tonnes. Ever-growing stocks and bad weather thus aggravated the industry's pro- blems.

The consumption (including provi- sional rabi figures) was 8996.1 thou- sand tonnes of NPK last year, regis- tering a positive growth of 2.9 per cent over the previous year. Phosphate consumption grew by 9.5 per cent fol- lowed by potash 9.2 per cent. How- ever, the consumption of nitrogen de- clined marginally by 0.4 per cent.

The total production of fertilisers in the country was of the order of 5.467 million tonnes of N and 1.665 million tonnes of P205 against pro- duction targets fixed at 5.6 million tonnes of N and 2.1 million tonnes of P205 respectively.

The average capacity utilisation of N was 78 per cent and that of P205 was 72 per cent compared to 79 per cent and 81 per cent respectively dur- ing the previous year. The main rea- sons for the low production were shor- tage of imported phosphoric acid,

ROCK PHOSPHATE IMPORT : JAYSHREE CHEM TO USE HALDIA DOCK

Jayshree Chemicals and Fertilisers, a division of Jayshree Tea and Indus- tries Limited, has decided to use Hal- dia dock in preference to Vizag for importing about one lakh tonnes of rock phosphate a year.

With this Haldia's total annual hand- ling of rock phosphate is to go up to about two lakh tonnes. Hindustan Le- ver has already been importing throu- gh the dock about a lakh tonnes every year for its fertiliser plant located at Haldia.

Although Haldia dock can boast of a full-fledged phosphate berth, origi- nally planned to cater to require- ments of the Hindustan Fertiliser Cor- poration's unit there, rock phosphate ships do not always have immediate berthing. This is because presently the berth is also being used, tempora- rily though, for handling petroleum product tankers which get priority ber thing. As a result, the first ship carry- ing about 14,000 tonnes of rock phos- phate for Jayshree Chemicals had to wait for about 10 days before her turn for berthing came.

Port sources, however, call it "an unusual" event caused mainly by the bunching of ships at the sandhead due to bad weather. Normally, a rock phosphate ship is not required to wait for such a long time even when im- mediate berthing is not available, the sources observe adding that the phos- phate berth will soon be available for phosphate ships only as product tan- kers are being diverted to the ore ber- th. The ore berth which has been handling product tankers for some time in view of the dearth of ore traffic at Haldia had to be put out of operation as some modi- fications are being effected to equip it also for handling coal traffic.

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Formula for funding CSIR labs evolved

An interesting three component formula for the funding of the various laboratories of the Council of Scientific and Industrial Research (CSIR), which goes towards implementing one of the main recommendations of the CSIR Review Committee, was evolved at the two-day CSIR Directors' meeting which concluded in New Delhi on July 6. The formula incorporates far reaching changes and in trying out these the CSIR will be the only organisation in the country to do so.

One of the recommendations of the Review Committee headed by Mr. Abid Hussain, Member, Planning Commission, was that the CSIR institutions should earn one-third of their annual budgets from external sources. Since the spectrum of CSIR labs range from basic research institutions to total R&D institutions not all of them could be expected to generate as much as one-third of the funding from outside agencies. The differing positions and opinions on this issue were voiced by the respective directors at the meeting which helped devise a formula approach.

The formula arrived at essentially seeks to accommodate these varying earning capacities — some institutions, in fact, already earn much more than a third — in such a way that the CSIR as a whole does manage to generate one-third of its budget from outside sources. At the same time, the mechanism provides sufficient incentive for all the CSIR labs, including the pure research ones like the Centre for Cellular and Molecular Biology (CCMB), Hyderabad, to innovate and generate income through other channels.

The primary component corresponds to the core (non-plan) budget and this fixed quantum of funding for each institution will be proportional to its strength of staff personnel and the already existing infrastructure. This is expected to remain at a level so that the institution does not become too much of a liability. The other two components relate to income from sources external to the CSIR. These external sources can be other Government departments or the private sector.

The first of these is directly linked to funds generated through grants, sponsored projects etc., which essentially contribute to the CSIR's plan part of the budget. According to the scheme, the Government will provide an additional funding over and above the core sum in the yearly budget, proportional to the external funding generated by the CSIR as a whole during the previous year. This proportionality factor will be 1:5 in the first year and this 'incentive' funding will be gradually reduced so that it becomes 1:1 at the end of the fifth year; that at the end of five years the Centre's input will just match the earnings.

R & D earning :

The second component relates to the R & D earning of the CSIR. R&D funding refers to the money earned from consultancy services and technology transfers to the industry. There are two components to it: the first includes revenue gained by provision of equipment, manpower, consumables, etc. And the second includes "intellectual fee' for the knowledge that has been transferred and the royalty. A certain percentage (roughly 30 per cent) of the latter component, which itself used to be about 10-25 per cent of the total project cost, apparently used to be taken back by the Government by physical deduction from the following year's budget.

The innovation that has been proposed now is that this intellectual component of the R&D earnings will not only be retained by the CSIR but the Government will supplement this with an equal amount in the first year growing up to 1.5 times this earning in the fifth year — "giving recognition to the CSIR's intellectual input" as Dr. Ram K. Iyengar, Additional DG of the CSIR, put it. Currently this amount for the CSIR as a whole is around Rs. 6 crores.

Given these two additional 'incentive' funding components, the CSIR will in turn apportionate internally depending upon the character of the institution. In the opinion of Dr. Iyengar, now that even the plan budget has a string of incentive attached, the me-

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chanism will induce basic research labs also to come up with special projects and offer it to outside agencies. "Basic research can also be sponsored," Dr. Iyengar said, and added "it depends on your marketing strategy." How to go about generating the market for CSIR know-how was another aspect which the meeting discussed.

However, according to Dr. S. K. Joshi, Director, National Physical Laboratory (NPL), New Delhi, the calculation of funds generated through outside agencies was somewhat deceptive. He pointed out that the NPL has now been given a Rs. 2.03-crore grant for research on high-temperature superconductivity. "Will this large sum form part of the second component in the formula?" At present the outside earnings of the NPL are of the order of Rs. 20 lakhs, the bulk of which comes from grants out of its total budget of Rs. 7.5 crores. The amount earned through its National Testing and Calibration Programme has been apparently very small.

A new role for the National Research Development Corporation (NRDC), which was divested from the CSIR umbrella two years ago, was accorded in the meeting. The Corporation is now expected to sell its capabilities to the CSIR so that the CSIR technologies could be handed over to the NRDC depending upon their marketing offer. According to Dr. Joshi, the NPL technology of Phosphor coating for B & W TV tubes has been successfully marketed by the NRDC on July 4, 1988 to two parties and according to the NRDC there a few more who are interested in the NPL technology. The know-now has apparently been sold for Rs. 10 lakhs.

The other topics which came up for discussion were how to draw up guidelines for large projects with financial inputs of a few crores and above, the patenting of CSIR technologies and the present patenting position of genetic engineering technologies. Testing units of the CSIR labs, which generate some amount of earning to the CSIR, were deemed as National Testing Facilities and all the earnings from these also will now be retained by the CSIR. The meeting also discussed issues of restructuring the administration with the aim of streamlining it.

FOOD & BEVERAGES EXPO

Keeping in view the rapid strides being made by the Food industry and the growing demand for the good things of life especially food, the publishers of BEVERAGE & FOOD WORLD are organising FOODS & BEVERAGES EXPO '89 to be held at Nehru Centre, Worli, Bombay, from Dec.31-Jan. 4, 1989. An ideal location, the exhibition will cover an area of over 30,000 sq. ft.

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News in Brief

S&T VITAL FOR FASTER GROWTH

Prof. M. G. K. Menon, Scientific Advisor to the Prime Minister, said that it was time to evolve a strategy and mechanism to achieve rapid progress through scientific and technological endeavours.

Presenting the theme at a two-day symposium in New Delhi on Science and Technology for National Development, Prof. Menon said there were great expectations from science and technology in the context of national priorities. Science had to be made an integral part of all spheres of national activity, particularly of the lives of the common people.

Prof. Menon, who is also Planning Commission Member and President of the Indian National Science Academy, said a large infrastructure of science and technology now existed in the country and capabilities and expertise of a high order had been developed in several disciplines.

Prof. Menon said it was appropriate now to take stock of scientific development in the country and ask: What are the expectations from science: What are the tasks and opportunities before the scientific community: and how can science be made more effective in improving the living conditions of large masses and attacking the problems of poverty.

The subjects for discussion include: Expectations from science and technology: Tasks ahead for the science and technology community: Role of professional bodies in harnessing science and technology to benefit society and implementation strategies.

The symposium will offer an opportunity for critical introspection and self-assessment on the part of the scientific community and will focus on steps for effective use of science and technology for national development. The symposium has been organised by the Indian National Science Academy.

EXCISE RATES CHANGES

The Government has announced modifications in the excise rates of certain goods.

The Government has exempted unwrought zinc in any form from the whole of the duty of excise leviable provided that the said unwrought zinc is produced or manufactured from zinc dross, zinc ash or residues thereof on which the duty of excise leviable on the additional duty leviable under the customs tariff had already been paid.

That no credit of the duty paid on the inputs had been taken. Nothing in this notification (No. 224/88 Central Excise) would apply to unwrought zinc in any form or articles thereof produced or manufactured by a primary producer.

Another notification 218/88 has exempted painted, lacquered or varnished sheets made from duty paid sheets, including tinned sheets from excise duty.

Yet another notification said that the Government has exempted ammonium chloride and manganese sulphate from the whole of duty of excise leviable provided they are not used as fertiliser or in the manufacture of fertilisers.

CHEMEXCIL HOPES TO TOUCH EXPORT TARGET

Mr. Ramu S. Deora, chairman of Basic Chemicals, Pharmaceuticals and Cosmetics Export Promotion Council (Chemexcil), is confident that the export target of Rs. 900 crores for the council's products for 1988-89, which envisages an increase of 15 per cent plus on the last fiscal year, will be achieved.

Mr. Deora, who was addressing a meeting of Chemical members from the eastern region in Calcutta on July 8, said active participation of small-scale units in Chemexcil's exports has had a salutary effect on the performance in the last two financial years. From Rs. 478 crores in 1985-86, Chemexcil's exports picked up to Rs. 562 crores in 1986-87 and further to Rs. 783 crores in 1987-88.

Exporters of bulk drugs did particularly well in the last financial year. The scope for bulk drug exports continued to be encouraging, particularly in the US market. Exporters had earned the confidence of importing agencies in the US and officials of the US food and drug administration, who had come to India in February last, had appreciated the efforts of Indian drug manufacturers in sticking to supply schedules.

The Chemicals panel too did well on the front in 1987-88 and the prospect for the current fiscal year appeared encouraging. The inclusion of agro-chemicals in the trade protocol with the USSR was a positive development, Mr. Deora said.

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ONGC'S OVERSEAS CONSULTANCY

Talks on with Petronas

As part of its overseas operations, Oil and Natural Gas Commission (ONGC) is negotiating three consultancy projects with Petronas, the national oil company of Malaysia.

A high level delegation from Petronas, which was at Bombay some months ago, had visited the facilities available at the Institute of Reservoir Studies (IRS). A delegation of the commission also visited Petronas recently.

Petronas has shown interest in the innovations done by IRS in areas like water shutting from producing wells, wells stimulation from poor-producing wells, reservoir models for performance evaluations of other fields, heavy oil injection for suppressing water coning to produce waterfree oil from thin oil nim, electron microscopy, additives for breaking emulsions, and evolving a methodology to handle and analyse special cores. Most of the research in these fields was done by IRS for ONGC.

ONGC has also sent proposals to the National Oil Company of Libya regarding underground gas storage project in Serra fields of Libya, operation and maintenance of Brega Misurata gas pipeline. It has also offered its consultancy services to Waha Oil Company of Libya in the field of core analysis bore techniques and stimulation studies.

Joint projects with Bangladesh Oil and Gas Mineral Corporation (BOGMC) are also under consideration.

Output to go up

Meanwhile, ONGC sources said that the commission is to exceed the targets worked out for the Seventh Plan. For instance, the original target for the Seventh Plan was production of 113.68 million tonnes, but the actual production would be close to 144 million tonnes. This estimate is based on the achievement of targets in the first three years of the Seventh Plan.

The sources said that the increase in production is mainly because of new oil and gas discoveries, the accelerated build-up in reserves and innovative strategies adopted before transforming discoveries into production through the early production systems.

The criticism that there has been a fall in production is baseless, said the sources, adding that the successes during the Seventh Plan have helped the commission in reviewing the targets for the Eighth Plan both onshore and offshore.

As per the existing estimates, the cumulative production for the Eighth Plan would be around 280 million tonnes and oil equivalent gas.

MRL AROMATICS COMPLEX: HINDUJAS MAKE APPLICATION

The Hindujas are reported to have made a formal application for the cosponsorship of the proposed aromatics complex of Madras Refineries. Thus, they are likely to be pitted against SPIC which is also interested in the project.

Simultaneously, the Hindusjas are also reported to have bid for the 840 mw IB Valley thermal power project in Orissa. They have also reportedly expressed an interest in participating in the equity capital of the power project to the extent of Rs. 26 crores. The word is that the Hindujas plan to set up and run this project in collaboration with Bechtel, the US engineering giant.

This, say observers, is likely to place Hindujas-Bechtel bid in direct competition against another American consortium and Japanese consortium. The first phase of this project is expected to cost over Rs. 450 crores.

The curious part about this bid is that it appears to presume that the Government will amend existing legislation concerning power generation and supply. Only such an amendment will enable the Hindujas to run the power project at a profit. This also means that such a project will be allowed to sell the power it generates.

At present, power generating units are allowed to use such power for captive consumption or else to sell the surplus power to State electricity boards at not-so-attractive prices.

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OIL fails oil target

Thanks to continued dismal performance of Oil India Ltd. (OIL), the country may miss the Seventh Plan crude production target by a whisker.

According to Petroleum Ministry sources, during the first three years of the Plan, OIL has produced a a total of 7.72 million tonnes of crude, over 11 per cent short of the target fixed at 8.71 million tonnes for this period.

Going by the present trend, OIL at best is expected to end up the Seventh Plan with a cumulative crude output of 13.29 million tonnes, showing a shortfall of 1.70 million tonnes over the target of 14.99 million tonnes.

But this slippage by OIL is expected to be made-up to a great extent by the Oil and Natural Gas Commission (ONGC) which is slated to contribute 142.79 million tonnes out of total Plan target of 157.78 million tonnes.

Against a target of 82.10 million tonnes fixed for the first three years of the Seventh Plan for ONGC, it has produced 83.28 million tonnes. The year-wise break-up (with the target figures in brackets) — is-1985-86 27.51 million tonnes (27.11 million tonnes); 1986-87 27.86 million tonnes (27.37 million tonnes) and 1987-88 27.91 million tonnes (27.62 million tonnes).

The optimism to reach the target flows from the assumption that even if the Commission just manages to hit the target fixed for it at 29.28 million tonnes for 1988-89 and 31.41 million tonnes for 1989-90, it would be able to produce total of 143.97 mil tonnes of crude, i.e. over one million tonnes more than its target of 142.79 million tonnes, and in the process to compensate for slippage by OIL to a large extent.

Taking together the cumulative contribution by OIL and ONGC during the Seventh Plan, expected at 13.29 million tonnes and 143.97 million tonnes respectively, the million tonnes respectively, the country will thus be able to produce 157.26 million tonnes. And with little extra effort by the two organisations, the Petroleum Ministry sources say that it should not be difficult to bridge the gap estimated at 0.52 million tonnes between the target and the expected performance.

A notable feature of the Seventh Plan has been a build-up in the geological reserves by ONGC. As against a target of 970 million tonnes, reserve accretion during the Plan period, already 823 million tonnes of oil and oil equivalent of gas have been added in the first three years of the Seventh Plan (1985-88). The reserve accretion during the Eighth Plan is projected to be 1,220 million tonnes.

Meanwhile, ONGC is reviewing its targets for the Eighth Plan, keeping in view the large number of discoveries made in the recent past, both on land and offshore. As per the existing plan, the cumulative production for the Eighth Plan is expected to be about 280.7 million tonnes of oil and oil equivalent of gas (OEG) (187.660 million tonnes of oil and 93.016 million tonnes of gas). The cumulative production during the Ninth (1995-2000) and Tenth Plan (2000-2005) has been projected to leap to 368.07 million tonne (oil-238.630 million tonnes and gas-129.444 million tonnes) and 460.643 million tonnes (oil-298.520 million tonnes and gas — 162.123 million tonnes) of oil and OEG.

Mitsui offers to set up petrochem project

Mitsui of Japan has offered to set up a petrochemicals project at Visakhapatnam in collaboration with an Indian partner to be nominated by the government.

The offer includes a comprehensive technical and financial collaboration package for the project.

Although a decision has yet to be taken, indications are that the Indian Petrochemicals Corporation Limited (IPCL) may be selected as the partner.

Negotiations are at an advanced stage. But a clearer picture will emerge only in September when a Mitsui delegation arrives at New Delhi on July 3rd for a final round of discussions.

India is apparently keen to avail of the Japanese offer because of the attractive terms as well as the widening gap between demand and supply of petrochemicals. It has, in fact, suggested that Mitsui should also have equity participation in the project.

According to preliminary estimates, the Vizag project will cost roughly Rs. 1800 crores. It will have a capacity of 300,000 tonnes of ethylene and 150,000 tonnes of polymers. In view of the anticipated increase of 15 per cent in demand for petrochemicals over the next few years, the creation of new capacity will be a boon for a large number of plastics processing units.

Lately, India has been experiencing an acute shortage of polymers including HDPE, LDPE, polypropylene and PVC. Numerous official delegations have visited various countries all over the world in search of ethylene and polymers but have met with only limited success. Fortunately, it has been possible to tie up sufficient quantities to tide over the crisis till December. Efforts are being made to conclude contracts quickly with major suppliers like France, USA, Brazil, Saudi Arabia and Japan so that shipments can be made at the earliest.

With such huge imports of polymers in the offing, the government is now thinking in terms of setting up a separate port for handling petrochemicals imports. It is felt that a new port could be created near a major petrochemical complex on the west coast to handle not only the present imports but also exports in future. The locations currently being considered are Hazira in Gujarat and Raigad in Maharashtra.

The real answer to the problem, of petrochemical shortages, however, lies in establishing adequate capacities within the country. The government has already approved the Gujarat petrochemical project to be put up by Reliance Industries and is also to take a decision soon on the Haldia project. The Mangalore Refinery cum petrochemicals complex has also been sanctioned in order to meet the needs of the southern region. The implementation of the Maharashtra Gas Cracker Complex (MGCC) is under way as well and it is expected to go on stream by 1990-91.

ONGC setting up three R & D institutes

The Oil and Natural Gas Commission (ONGC) will set up in the current year three research and development institutes to cope with the demand for newer petroleum technologies.

Commission sources said in Calcutta that South Asia's first institute of biotechnology and geo-tectonic studies would be set up at Jorhat.

Petroleum biotechnology accounts for exploring the possibility of increasing the productivity and quality of hydrocarbons by investigating the behaviour of certain microbes in the formation, while geo-tectonics holds significance in the context of exploration and exploitation of petroleum resources along the Himalayan and Schuppen belts of the country's north-eastern States.

Of the other two, the institute of petroleum safety and environment management will be set up to inculcate safety consciousness and concern for environment in people associated with the petroleum industry.

The third would be set up at Goa, initially to take on the requirements of "offshore survival", involving oil fire fighting, navigation, communication, survival after helicopter ditching, and the like.

As per ONGC's thinking, the scope of the third institute would be expanded later to cater to operations in deep waters, hostile marine environment and hyperbaric safety.

The sources said an estimated Rs. 16 crores would be expended on setting up the institutes. Of that, the bulk, about Rs. 9 crores, would be spent in a phased manner on the Goa institute. Once the three R and D institutes are operational, the number of R and D institutes under ONGC's tutelage would go up to eight. The present institutes are located in Dehradun (two), Bombay (two) and Ahmedabad.

The sources further said the advisory group that has been set up to keep tabs on technological developments in the petroleum industry the world over has suggested an R and D linkage between ONGC institutes and scientific and technical organisations and university departments within the country.

In fact, in keeping with the group's up to concentrate only on adaptative R and D. As per the scheme, basic research would be farmed out to universities and technical institutions through sponsored projects and joint research programmes.

The existing R and D institutes have so far taken nine patents. For the first time, ONGC has entered into a contract with a Canadian firm named Geofge and Nicks Machine Works Ltd. for transfer of technology on photo-inclinometer. The product developed with ONGC technology would be manufactured and marketed by the Canadian firm. A US patent has also been granted for the design.

Incidentally, the improved version of the instrument is also on patent list of such countries as Canada, France, West Germany and the USSR. By an official estimate, it will lead to a foreign exchange saving of about $ 100,000 a year to ONGC on the basis of eight per cent royalty on each equipment sold by the Canadian company.

The Commission has outlay of Rs. 248 crores on R & D. Of the total outlay about Rs. 30 crores will be spent on the pilot project relating to underground gasification of coal. By contrast, the outlay in the Sixth Plan was only Rs. 35 crores.

The Rs. 50-crore underground coal gasification project envisioned setting up of pilot project at Mehsana in Gujarat for establishing the feasibility of commercial scale operations for exploiting huge coal reserves.

The coal reserves in north Gujarat are around 63 million tonnes with an estimated potential to produce energy equivalent of 15,000 billion cubic metres of natural gas.

GRAVITY DATA ON BOMBAY HIGH

ONGC, NIO joint research

A joint research project for acquisition of high precision gravity data on the Bombay High region and its adjoining areas has been taken up by the Oil and Natural Gas Commission (ONGC) and the National Institute of Oceanography (NIO).

Under the project, data on about 8100 line km of marine gravity would be acquired of which the two organisations had already acquired data on about 4000 line kms before the monsoon, a spokesman of the NIO said at Panaji.

The data thus collected would be utilised to decipher the structural and tectonic setting of the area, the spokesman added.

In addition to the collaboration with ONGC, NIO has taken several steps to augment the process of research and development programmes.

NIO had further activised its projects under the national programmes of survey for polymetallic nodules on the central Indian Ocean and other areas relevant to societal mission, an NIO spokesman said.

Thanks to NIO for its further exploration work on the central Indian to obtain certain rights for mining of polymetallic nodules on the ocean floor from the United Nations, the spokesman said.

This provided India exclusive rights for mining 1,50,000 sq. kms, the spokesman added.

NIO had also provided technical assistance to Mauritius for conducting a multi-disciplinary oceanographic study on board "ORV Sagar Kanya" in the exclusive economic zone of the country during September-October last year, the spokesman said.

NIO had collected data on physical, meteorological, biological and geological oceangraphic parameters for evaluating ocean environment and marine resources in the exclusive zone, he added.

NIO has completed mapping of coastal lands along Goa and Maharashtra and demarcated area for mariculture and mangrove afforestation.

NIO had also developed mangrove afforestation techniques and transfered them to other agencies for implementation, the spokesman said adding it had also developed remote

Sathe for allocation of gas for power generation

The Union energy minister, Mr. Vasant Sathe, recently strongly advocated the allocation of natural gas for generation of power in the country.

Considering the gestation periods normally involved in the implementation of hydro and coalbased thermal projects and the need to bridge the gap between the demand and supply of power in the shortest possible time, it had become imperative to explore other options of installing generating capacity by way of schemes which can be completed in a time frame of two three years, he said adding that the setting up of gas-based power stations offered an attractive short term option. This was particularly true in the light of successes registered in the exploration of domestic sources of natural gas and the indications that the further prognostication of this resource would be appreciable and could provide a basis for increasing the use of gas for power generation.

In his inaugural address at a seminar, "natural gas — its impact on the economic development of Gujarat"' organised by Gujarat Foundation for Development Alternatives, at Ahmedabad recently, he said that as of now, natural gas to the extent of 11.36 million cubic metres per day (MMCD) was committed for power generation on a firm basis and 6.25 MMCMD on fall back basis. It was apparent that the availability of gas for the power sector, over and above the present commitments, would depend on the inter se priority determined for its utilisation, as between power generation and other uses.

The capital costs of conventional hydro and coal-based thermal stations are now in the range of Rs. 12,000 to Rs. 15,000 per kilowatt installed while those relating to gas-based power plants are of the order of about Rs. 8,000 per kilowatt installed. The utilisation of natural gas for power generation, is, therefore, an economically feasible option on the basis of the available technologies.

Mr. Sathe said an analysis of the power position in Gujarat showed that more than one option in regard to augmenting the availability of power would need to be pursued in order to overcome the peaking and energy deficits which may occur in the Eighth Plan period. It would be relevant to examine the question of establishing thermal stations at suitable locations where coal could be transported by sea route as also the possibilities of harnessing the benefit of new sources of energy. Gasification of coal at appropriate sites could be another possible option for the state. In addition to the investigations, which were in progress, for a tidal power station of 850 MW capacity in Kutch, studies have been initiated in respect of locating coal-based thermal plants at coastal sites in the western region, he said.

Additional gas-based power plant capacities of 123 MW at Utran and 60 MW at Dhuvaran have recently been suggested for benefits in the Eighth Plan period in Gujarat. Feasibility report in regard to a 600 MW gas-based station at Gandhar has been technoeconomically cleared by CEA. The feasibility report for a 815 MW station in South Saurashtra is being examined by CEA.

Mr. Sathe cautioned that whenever the use of gas is considered as a short tern means of augmenting power generation, whether in Gujarat or in other parts of the country, it would be necessary to ensure that such options form part of the overall national power programme as formulated on the basis of the long-term, optimum utilisation of various energy resources.

In the opening session of the seminar, the Gujarat chief minister, Mr. Amarsinh Chaudhary, and the minister of state for energy, Mr. Nalin Patel, also spoke while the Planning Commission member, Mr. Hiten Bhaya, delivered the key-note address.

In his opening remarks, Mr. Sanat Mehta, the president of the foundation, said a working group chaired by the former Union petroleum secretary, Mr. Lavraj Kumar, would take follow-up measures on the various ideas thrown up at the seminar. The topics of discussion are natrual gas utilisation in the state of Gujarat and use of natural gas for

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ONGC to raise yen 20 million

The Finance Ministry has allowed the Oil and Natural Gas Commission (ONGC) to raise yen 20 billion through a public issue of Samurai bonds in Japan without Government guarantee.

The bonds, to be listed at the Tokyo Stock Exchange, are expected to open for subscription early next month.

The issue would be underwritten by the Nomura Securities, which would charge a commission of 1.6 per cent of the total amount to be raised. Also involved will be seven other banks with the Bank of Tokyo acting as the lead bank.

This would be the first time that an Indian company would be going for external commercial borrowings without Government guarantee. It would also be for the first time that ONGC, which has tapped the Japanese market earlier also, would be doing so through a public issue to reach the investors directly. Earlier, ONGC had been allowed to go for private placement in Japan.

The rate of interest to be offered would be decided a few days before the issue opens by mutual agreement between the Nomura Securities and the Stock Exchange authorities taking into account the then prevailing rates.

The first public issue of bonds in Japan is likely to provide a test for the credit rating of the Indian companies. ONGC has been chosen for the task as it is already well known in the Japanese market. Though the first issue of Samurai bonds is not expected to be on very favourable terms, the cost is likely to come down in the subsequent issues. A decision on whether to go in for more such issues would depend on the results of this issue.

On the whole, the Government has decided to follow a very cautious policy with regard to external commercial borrowings this year. The total borrowings to be allowed this year are likely to be much less than last year.

The total commercial borrowings last year amounted to about Rs. 2,000 crores. The sanctions were, however, higher at Rs. 2,500 crores. Some of borrowings sanctioned last year are being raised this year.

The cautious policy is being followed because the country's debt service ratio has already reached a very huge level, far exceeding the Seventh Plan limits. The World Bank has also advised India against depending too much on external commercial borrowings.

Second, the interest rates in the international market are likely to firm up in the coming months. If the rates really go up as is being feared, the cost of raising the money abroad will become very high.

However, the Finance Ministry is not putting any restrictions on refinancing the past loans which were taken at very high rates of interest. By taking advantage of the lower rates of interest during the last two years, a number of companies have gone for new loans substituting the old loans and saving a considerable amount in the process.

ONGC SIGNS PACT TO PROTECT ECOLOGY AROUND PROJECTS

The Oil and Natural Gas Commission (ONGC) and the Council of Scientific and Industrial Research (CSIR) on July 4, signed a memorandum of understanding (MoU) for protecting the environment around offshore and onshore drilling projects, oil refining units and pipelines

The highlight of the MoU is that the National Environmental Engineering Research Institute (NEERI) of CSIR will help ONGC in the development of an integrated environment management plant.

NEERI will provide guidance on the establishment of air and water quality monitoring stations and laboratory at ONGC's facility at Uran near Bombay.

NEERI will also assist ONGC in assessing the impact on the environment around ONGC's offshore and onshore drilling projects, oil and gas processing and refining units as also oil pipelines.

The Nagpur-based institute will render technical help for microbial degradation of sludge emanating from crude oil, treatment of waste at drilling sites and development of disposal techniques for waste drilling fluids and drill cuttings.

The MoU was signed on behalf of ONGC by Mr. S.K. Mangalik, Member (Technical) and CSIR Additional Director-general, Dr. Ram K. Iyengar.

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CARBIDE, BOMBAY OR HALDIA PLANTS

IPCL unlikely to be involved

Contrary to reports circulating in the petrochemicals industry circles, there is no move on the part of Indian Petrochemicals Corporation (IPCL) to either run the closed Union Carbide plant which was manufacturing LDPE in Bombay or involve itself in the implementation of the Haldia petrochemical project. Nor has the government approached IPCL to undertake these ventures, company sources said.

IPCL's name crops up now and then regarding these projects simply because it has the expertise and has proved itself as a successful implementer of such plants, the sources said.

Regarding the Salempur aromatics project in Uttar Pradesh, that state's development agency PICUP which had a letter of intent for undertaking the project, had recently shown willingness to discuss the issue with IPCL. Here too there is no formal proposal or government directive to IPCL to involve itself in the Rs. 600-crore project. This plant would be basically for obtaining xylenes which have applications in DMT and PTA manufacture (paraxylene), paints and pesticides (mixed and orthoxylene).

Incidentally, the original Saleempur project had been prepared by IPCL personnel about five years ago. Since then various private parties like Birlas, the JK group and Reliance have tried to edge into the project but to no avail. Now that IPCL is once again in the picture the matter will have to go to the board before any concrete interest in the project on IPCL's part takes shape.

But according to the sources, IPCL is not overtly interested in the aromatics project although if the government asks it to do so it would certainly step in. The reason is that IPCL's preference is to go for a cracker plant in which it has the capability and experience. Moreover, it would not like to get into two things at a time.

Not long ago IPCL was involved with a similar project to manufacture xylenes at a plant in Tamil Nadu in partnership with Madras Refinery Ltd. (MRL). The idea was IPCL would convert it to PTA. But the tie-up fell through six months ago as no proper modalities could be worked out on other aspects of the business. Current reports are that Spic might fill the IPCL vacuum.

Regarding the Union Carbide plant which has the capacity to manufacture 20,000 tonnes per annum of LDPE, the thinking is that this level of production will save the country foreign exchange to the tune of Rs. 30 crores annually especially when there is a shortage of the commodity. At present as much as one lakh tonnes of LDPE and LLDPE worth around Rs. 200 crores are imported.

But there are two reasons why IPCL is not keen on running the plant. First, the government does not want to complicate the Bhopal gas leak case by reopening one unit of Union Carbide. Secondly, 20,000 tpa capacity is not an economically viable size in the present day to operate. A minimum capacity of 80,000 tpa is the requirement. "IPCL, however, is strictly neutral in the matter," the sources said.

As for the Haldia project in IPCL's view the size of 1.3 lakh tonnes of various petrochemical products may appear viable at the present price of these items internationally in view of the acute shortage worldwide. But in the long-run a minimum capacity of 3 lakh tonnes is a prerequisite to face competition successfully. And a plant of this size will require an investment of Rs. 1,800 crores at current prices. No private industrial house has the capacity to pump in that kind of equity even if the debt-equity ratio were to be hiked significantly.

There is another problem too. The feedstock available from the IOC's Haldia refinery is limited and cannot sustain a three lakh tonne plant.

On its part, IPCL would like to set up the Vizag ethylene project of 3 lakh tpa capacity with naphtha feedstock from the Vizag refinery. This would involve investments of depending on downstream outlays. After the receipt of licence IPCL is hopeful of commissioning it in 36 months to 42 months time. It hopes to find such huge sums of money from its Maharashtra cracker plant which is expected to go on stream in end-1989.

Another unique project IPCL is keenly engaged in is engineering plastics, such as poly-carbonate and PPO. An agreement has been signed with General Electric, who are world leaders in this field, and IPCL has become selling agents for these products in India to develop the market. Before the end of next year it will set up an application development centre and thereafter a compounding facility By 1992-93 it will begin real resin manufacture.

At present the method of making these resins is through the phosgene route and after the Bhopal tragedy phosgene has become a dreaded chemical. However, by the time IPCL puts up its own plant General Electric is confident of developing a non-phosgene route. The investments here will be Rs. 500 crores.

CIL'S STRATEGY FOR UNDERGROUND MINES

After suffering heavy losses, Coal India Ltd. (CIL) has now drawn up a broad production strategy for underground mines to achieve the target of 192 million tonnes in the Seventh Plan.

A CIL spokesman said at Calcutta on July 10, that all the subsidiary companies have been asked to fix separate targets for underground and open cast mines. No subsidiary company would be allowed to cover the shortfall of underground mines by the production of open cast mines.

The decision resulted from a meeting recently at Ranchi between the Union Minister of State for Coal, Mr. C.K. Jaffar Shariff, and CIL's top officials.

CIL has suffered heavy losses mainly because of low productivity in the underground mines, a majo-

ONGC's special thrust in Cachar fold

Exploratory efforts in the Cachar old belt forming a part of the Assam-Arkan basin are being given a pecial thrust by Oil and Natural Gas Commission (ONGC) during the current Plan period.

With prognosticated resources estimated to be about 460 million tonnes of oil and oil equivalent of gas, the Cachar fold belt is considered to be highly prospective.

Geophysical survey work over this belt extending over an area of 7000 sq. kms. has helped in identifying 26 structures for drilling in the Cachar fold belt. Out of these exploratory drilling has been carried out at Badarpur, Kanchanpur, Chargola and Adamtila. Drilling is presently under progress at four new structures at Hilaria, Masimpur, Banaskandi and Patharia.

Gas has been struck by ONGC in the first well of Adamtila structure located 60 kms. west of Silchar in the karimganj district of Assam. The well drilled down to a depth of 3043 metres flowed gas at the rate of 1.1 lakh cubic metres per day. Further testing is in progress.

The discovery at Adamtila has opened up a new lead for exploration in the highly prospective Cachar fold belt in Assam.

Presently, five rigs are deployed in Cachar area and four more are likely to be added by the end of the Seventh Plan (1985-90). ONGC has so far carried out 25 party years of geological and 13 party years of geophysical work.

Two geological parties are expected to cover an area of about 3150 sq. kms. during the remaining part of the Plan period. The plan of seismic work envisages deployment of departmental and contractual parties to acquire nearly 9000 line kms. of date during 1989-90.

ONGC initiated geological surveys as far back as 1959, and uptil 1966-67, the entire area of Cachar fold belt has been covered by reconnaissance survey with semi-detailed and detailed studies in selected parts of the terrain. Subsequently geophysical surveys were initiated in 1967-70.

The Cachar fold belt covers a total area of about 2,00,000 sq. kms. The basin extending in the States of Assam, Arunachal Pradesh, Nagaland, Mizoram, Manipur, Tripura and Meghalaya has immense hydrocarbon potential. The prognosticated hydrocarbon resources of this basin are estimated to be two billion tonnes of oil and equivalent of gas.

ONGC started its operation in the north-eastern region in 1958. So far more than 130 structures have been identified by ONGC, of which about 50 structures have been explored by drilling. More than 900,000 metres of exploratory drilling has been done in this region by ONGC and about 300 exploratory wells have been drilled.

The deepest well in this region has been drilled to a depth of 5028 metres. The best known and fairly well explored part of the region by ONGC is the south Brahmputra valley. So far, it has established Lakwa-Lakhmani, Rudrasagar, Gleki, Demulgaon and other fields in Brahmputra valley, Borholla field in Dhansiri valley, Changpang field in Schyppen belt of Nagaland, Rohhia, Baramura and Agartala gas fields in Tripura and Badarpur fields in Surma valley.

ONGC commenced production from Rudrasagar field during 1966. In 1981-82, the production from the region was 1.875 million tonnes which gradually increased to 2.74 million tonnes in the year 1987-88. From 13 drilling rigs in 1980-81, the rig count has gradually been increased to 37 drilling rigs.

The Seventh Plan envisages a total production of 15.03 million tonnes from the region, with a terminal year production of 3.1 million tonnes.

BIRLAS GET OKAY FOR PAC UNIT

Birlas have received government consent to put up a new unit far manufacturing Poly Aluminium Chloride (PAC) in West Bengal.

The Rs. 3.35 crore project will come up at Kadamgachchi and produce 15,000 TPA of PAC and will be implemented by the Eastrn Spinning Mills and Industries of the group.

The cost of the project will be met by debentures Rs. 1.68 crore, foreign exchange loan Rs. 1.00 crores, and external accruals Rs. 67 lakhs.

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Polutech to merge with Coromandel

Polutech, a growing company in Tamil Nadu, is merging with the Coromandel Engineering Company following a formal approval from the Monopolies Commission. In pursuance of the High Court order in March, the company also convened a meeting of shareholders on April 29, at which the amalgamation has been approved.

Both the transferor and transferee companies belong to the Murugappa group (TI group as popularly known) and are inter-connected undertakings. Polutech is a small company with a paid-up capital of Rs. 707,320. While Polutech is engaged in the manufacture of pollution control equipments with its factory at Kakkalur in Tamil Nadu, Coromandel (with a gross fixed assets of Rs. 470 lakhs) is in the field of civil construction works and other allied engineering works.

For the one year ending September 1987, Polutech's net profit before taxation was Rs. 9.08 lakhs (against Rs. 6.45 lakhs for the previous year) on a net sales of Rs. 62.99 lakhs. Its net current assets was Rs. 10.81 lakhs. Its shareholding pattern is: 92.68 per cent held by Pushparang Investment Company, subsidiary of Coromandel, and the balance 7.32 per cent is scattered among outsiders.

Thus, there will be no major problem in the transfer of shares. In the scheme of amalgamation it is envisaged that Pushparany's share in Polutech will be transferred to Coromandel "to facilitate merger". The consideration for the other shareholders is: one equity share of Rs. 10 each as fully-paid up in Coromandel for every four equity of Rs. 10 each in Polutech.

The Polutech, with technical collaboration with EPI of Illinois (USA), was floated in 1981. It really turned the corner only in 1983-84 and since then its performance has been satisfactory. It has already secured big contracts from Ashok Leyland, Bundy Tubing, Shiram Fibres for commissioning effluent treatment plants. It had clarifiers, agitators and storage and dosing tanks developed from in-house design.

OZONE DEPLETION

SAFEGUARDS TO BE REVIEWED

A major scientific assessment will begin later this year to determine if the provisions of an international convention to limit the depletion of the earth's protective ozone are adequate or need to be strengthened.

Mr. Robert Watson, an environmental scientist with the National Aeronautics and Space Administration (NASA), told European scientists and reporters during a World-net television interview recently that the Montreal protocol signed by 24 nations last year represents "a significant step in the right direction," according to an USIS press release at New Delhi.

However, he added, there is still a question about whether its provisions are strong enough to prevent harmful changes in the world's climate.

Scientists from Europe, Japan, the Soviet Union and developing countries will participate in the assessment due to be completed by next July.

Speaking to participants in London, Paris, Brussels and Zurich, Mr. Watson said the protocol pledges to reduce the use of ozone-depleting chemicals by 50 per cent by 1999 and sets a global precedent for safeguarding both the environment and human health.

Mr. Watson, the co-ordinator of NASA's global habitability programme, said he has been requested by UNEP to organise a scientific assessment of the current condition of the earth's high altitude ozone layer.

"This new scientific assessment will include the latest data from Antarctica, global trends and what's happening in the arctic," he said.

Mr. Watson said many members of the US Congress "feel very strongly that we need to renegotiate the Montreal protocol to make it much stronger calling for much more stringent regulations on proposed bills call for a 90 to 95 per cent phase-out of chlorofluorocarbons in a period of three to five years.

ONGC TO INVEST RS. 65 CRORES FOR EXPLORATION IN TRIPURA

The Oil and Natural Gas Commission will invest about Rs. 65 crores on exploration work in Tripura during the current Plan.

ONGC sources at Agartala said the investment would be partly utilised in the construction and maintenance work of small entrepreneurs. Several low priority areas such as civil construction, transportation, electrical, mechanical and automobile work have already been earmarked for them.

While the ONGC would concentrate on exploration and drilling, the entrepreneurs would look after maintenance work and servicing.

The sources said the total number of wells in Tripura was expected to be about 50 by the end of the current Plan. The ONGC has so far drilled 24 wells while seven rigs are now in operation in the State.

The sources said commercial accumulation of gas had been discovered in Baramura, Gojalia, Rokhia and Agartala Demo so far. The prognostic resources of oil and oil equivalent of gas in the basin had been estimated at 831 million tonnes.

The ONGC has supplied 30.73 million cubic metres of gas to the Tripura State Electricity Department since March 1986 at the current rate of about 130,000 cubic metres a day.

Supplies from Gojalia and Rokhia structures were expected soon raising the consumption potential of gas for power sector to 1.1 million cubic metres a day by 1989-90.

The sources said at present two gas-based turbines of five mw each were operating and another would be commissioned by March next year. A 75-mw gas based project was under construction.

A preliminary study conducted by ONGC estimated the consumption potential at 4.4 million cubic metres per day in the State. Of this, 1.24 cubic metres can be used as fuel and the rest as feedstock for ferti-

COMPANY NOTES

Nicholas Laboratories

Nicholas Laboratories, manufacturers of Aspro, Albucid, Betavite Forte, Genticyn, other prescription medicines and Cleartone range of products in health care, skin care, hair care, beauty care and other areas, derives nearly 80 per cent of its sales income from pharmaceutical specialities. This low profile unit has quietly climbed up the graph of net sales income, gross profits and net profits over the years.

The net sales income rose rather modestly by 9.6 per cent, from Rs. 13.7 crores to Rs. 15.0 crores for the year ended June 1987. In 1985, the net sales income rose by 30.5 per cent and in 1984 by 21.5 per cent. Only in 1986, it fell by 27.2 per cent. The net sales income is reportedly slated to rise to Rs. 21.0 crores during the current year ended June 1988 and is expected to reach Rs. 25 crores in 1989.

Gross profits in 1987 were Rs. 0.8 crore up by 15.1 per cent from Rs. 0.7 crore in 1986. In 1986, they fell substantially by 43.0 per cent to Rs. 0.7 crore, from Rs. 1.3 crores in 1985. The year 1985 recorded a hefty rise of 42.2 per cent in gross profits.

Pre-tax profits rose by 52.6 per cent in 1987 to Rs. 0.6 crores from Rs. 0.4 crore in the previous year. In 1985, at Rs. 1.1 crores, pre-tax profits, rose by 64.3%. Pre-tax profits, however, have fallen in 1987 over 1983. Net profits rose by 30.0 per cent in 1987 to Rs. 0.3 crore from Rs. 0.2 crore in 1986. In 1986, the year 1985 saw a hefty rise of 67.7 per cent in net profits. It is worth remembering that of the four years between 1983 and 1987, 1985 was the best in terms of sales income, profits and profitability ratios, while 1986 was the worst one.

Profitability ratios have shown wide fluctuations over the years. Gross return on total capital employed rose from 13.3 per cent in 1983 to 15.5 per cent in 1985, but almost halved to 7.6 per cent in 1987. Gross profits, as a percentage of net sales income, improved fractionally from 8.0 in 1983 to 8.2 in 1985 but fell to 5.3 in 1986 and rose to 5.6 in 1987. Net profits on net worth increased substantially from 9.8 per cent in 1983, to 15.4% in 1985 but fell sharply to 4.3 per cent in 1987.

Profitability ratios came under pressure on account of severe control on selling prices. While other problems such as rising costs of inputs, labour unrest have had their own impact on the performance of the company, the company's just hopes of a fair Drug Price Control Order of 1987 were dashed to ground.

The world famous Aspro, a painkiller, has its origin in the First World War when George Nicholas, a young and industrious pharmacist from Australia, carried his pain killing Asprin from the kitchenroom to the battlefield. With Alfred, his brother, George converted science into industry and a profitable business. Aspro came to India in other house-hold remedy Kruschen Salts. With the Indian subsidiary of Britisn Schering under control, Nicnolas turned out other familiar products as Albucid, Aquaviron, Sorbitrate, etc.

In 1979, Nicholas of India and Indian Schering Ltd. were merged to become a single corporate identity — Nicholas Laboratories. In the same year, foreign equity holding was diluted to 40 per cent.

The company plans to keep up in step with its parent Australian Nicholas Kiwi Group's business activities that include medicines, skin care, shoe care, hair care, confectionery, candle and festive novelties, etc.

Equity earnings per share (Rs. 10 paid-up) was Rs. 1.78 in 1987, up from Rs. 1.40 in 1986. It was Rs. 3.58 in 1985 and Rs. 2.14 in 1984. Equity earnings per share was highest at Rs. 5.11 in 1983. Book value per share was Rs. 41.32 in 1987, almost doubling from Rs. 23.83 in 1986 and Rs. 23.13 in 1985. Book value was Rs. 18.93 in 1983 and Rs. 19.47 in 1984. It is evident that barring 1986, the company's performance has not undergone violent changes. The steadfast performance has enabled the company to declare equity dividend for 1982 and 1983, the company paid Rs. 1.50 per equity share from Rs. 1.60 in 1984, it stepped up dividend to Rs. 1.80 in 1985 to slash it to Rs. 1.50 in 1986 and to restore it to Rs. 1.80 in 1987.

The company has made a firm foothold in the pharmaceutical market and its products have been well accepted particularly among the growing rich and urban elite segment of the society. This has helped its shares to seek high levels. In 1983, the

15.00 (high and low, respectively) in 1984 it was Rs. 23.50 and Rs. 17.00. Price suddenly sought a range of Rs. 55.00 and Rs. 18.00 in 1985. In 1986, the range was Rs. 62.00 and Rs. 29.00. In 1988, the range is Rs. 58.00 and Rs. 47.00 so far.

The company has managed its resources rather well over the years. It has kept a tab on salaries and wages which have risen rather slowly from Rs. 2.30 crores in 1983 to Rs. 2.63 crores in 1984 and 1985. In 1986, the wage bill was Rs. 2.78 crores and in 1987, it was Rs. 3.77 crores. Only the latest year has shown a steep rise of 35.6 per cent. More or less a similar trend is seen in the average cost per employee which rose from Rs. 35,200 in 1982 to Rs. 40,200 in 1985 and to Rs. 46,100 in 1986. In 1987, it rose steeply to Rs. 68,900. However, a disconcerting aspect of the situation is a steady decrease in the number of employees from 694 in 1980 to 654 in 1983, to 603 in 1986 and to 547 in 1987.

The company has modernised its plants at Deonar and Ambernath and rationalised distribution of supplies and imposed tight control on inventories. As part of its overall strategy, the company has toned up its marketing and distribution network by introducing cost effective distribution through Regional distributors and wholesalers.

Piramals (Morarji Mills Group) now control the company after acquiring 24.8 per cent equity. Piramals are reportedly going to tone up pharmaceutical division with more financial support by concentrating on bulk drugs. Major managerial changes are afoot and so will be changes in is set on a course of changes in an atmosphere of keen competition, rising cost of manufacture and some uncertainty.

GRASIM PLANS Rs. 700-CR EXPANSION

Grasim Industries has planned to spend about Rs. 700 crores on new products and expansion of its cement project in a span of three years, according to Mr. Indu Parekh President.

As regards the new projects, Grasim has sought the Government's consent for setting up a sponge iron project in Maharashtra. This will be a unit of the company and not a joint venture with SICOM. This project will be based on natural gas and will have a capacity of six lakh tonnes per annum. Its application for a letter of intent is being considered by the Government.

Another letter of intent pending currently with the Government relates to a hydrogen peroxide project to be set up as a joint venture at Nagda in collaboration with a renowned company in the US. Grasim has already approached the Government for permission to manufacture colour television glass shells in collaboration with a Japanese firm.

The company has also received clearance under the MRTP Act for the manufacture of various types of worsted yarn by installing 50,000 worsted spindles in Bhind district, Madhya Pradesh.

Besides, applications are pending with the Government for industrial licences to manufacture linear alkyl benzene (LAB) and acrylonitrile.

Its expansion is to increase 20 lakh tonnes from ten lakh tonnes per annum. Negotiations with plant and machinery suppliers have been completed and the company has approached the Government with a capital goods application. The plant is expected to go into production by the second quarter of 1990. Tne cost of the expansion is estimated at Rs. 145 crores.

According to Mr. Parekh, its cement plant has achieved a capacity utilisation of 109 per cent during 1987-88 against the cement industry's average capacity utilisation of 75 per cent.

Meanwhile, the company is hopeful of reopening its Mavoor unit in Kerala in a couple of months. Operations were suspended in July 1985 and it continues to remain closed. The main reasons for the suspension of operations are the inability of the Kerala Government to supply the contracted quantity of wood, an exorbitant rise in its royalty, remand for higher wages and the burden of surplus labour alone with other labour demands. All these factors have made the working of this plant extremely difficult. The company has told the Kerala Government that the resolution of these problems must be done keeping in view the principle of economic viability for the revival of this unit. The Kerala Government is seized of the matter.

Higher dividend, 3:4 bonus

The board of Grasim Industries has recommended a bonus issue of three for four. This will involve capitalisation of Rs. 16.20 crores. The last bonus issue was in 1977. The present equity capital is Rs. 21.59 crores.

In addition, it has raised the

the year ended March 1988 following excellent results. Last year, the dividend was 24 per cent. The proposed dividend will claim Rs. 5.94 crores against Rs. 5.18 crores. The usual preference dividend will absorb another Rs. 0.22 crore as before. Thus, the total dividend outgo is Rs. 6.16 crores compared to Rs. 5.40 crores last year.

The gross profit has jumped by 67.48 per cent to Rs. 58.45 crores from Rs. 34.90 crores in the previous year. This follows an increase of 27.15 per cent in turnover to Rs. 675.67 crores from Rs. 531.41 crores. The ratio of the gross profit to turnover has risen to 8.65 per cent from 6.57 per cent a year ago.

Adding the long-term capital gain on sale of investment in shares (Rs. 2.55 crores against only Rs. 0.04 crore), the profit is worked out to Rs. 61.00 crores compared to Rs. 34.94 crores in 1986-87. After depreciation (Rs. 39.01 crores against Rs. 26.34 crores) and taxation (Rs. 2.87 crores against nil), the aftertax profit has shot up to Rs. 19.12 crores from Rs. 8.60 crores.

According to Mr. Indu Parekh, President, this significant improvement in performance is the result of maximum productivity and efficiency. Despite a continuous increase in the costs of all the major inputs, including substantial increases in Government-controlled items, the higher production in the cement and chemical divisions, an improvement in the working of its textile division and a higher offtake of viscose fibre, have contributed to the company's profit.

Modernisation programmes are being continued with renewed vigour at its various units to reduce consumption of inputs and also to conserve energy.

Mr. Parekh has claimed that during the year Grasim has paid about Rs. 137 crores to the Government by way of excise duty and taxes. In addition, nearly Rs. 33 crores have been collected by the Government as excise, customs duties and sales tax on items purchased by the company.

The total production of its viscose staple fibre divisions has touched an all-time high at 1,12,742 tonnes against 95,330 tonnes last year.

During the year, the company has diversified its production range. It has also successfully launched new speciality fibres for giving special effects in fabrics.

The production of pulp is marginally lower at 60,551 tonnes against 61,918 tonnes at Harihar because of the complete overhauling of a recovery boiler. While the plant continues to be operated efficiently, serious shortage of pulpwood still persists on account of the Karnataka's failure to fulfil its commitment. Moreover, royalty rates have again been increased substantially effective from April 1, this year.

The working of its cement division has been satisfactory. The first unit of Vikram cement has recorded a production of 6.20 lakh tonnes against an annual capacity of five lakh tonnes, achieving a capacity utilisation of about 124 per cent. The new Vikram cement unit (second) has produced in its very first year 4.80 lakh tonnes against an annual capacity of five lakh tonnes, achieving a 96-per cent capacity utilisation.

Its caustic soda production during the year has been higher at 85,410 tonnes against 79,690 tonnes. The offtake and realisation of caustic soda as well as its by-products, chlorine and hydrochloric acid have improved. Its stable bleaching powder (SBP) plant has achieved 118 per cent capacity utilisation during the year.

Export of SBP has increased substantially over last year and this trend is expected to continue in future as well. The working of its textile unit at Gwalior has been satisfactory, despite severe drought and stiff competition from the powerloom sector.

For further downstream utilisation of chlorine, the company has received a letter of intent for the manufacture 6,600 tonnes of chloro sulphonic acid per annum. Implementation of the new poly aluminium chloride (PAC) project is under way.

The company expects a total turnover of over Rs. 1000 crores for 1991 from the existing product-line, according to Mr. Parekh.

THIRUMALAI CHEMICALS TURNOVER SOARS

Thirumalai Chemicals, incorporated in 1972 as a Bombay based company promoted by Chemidye Trading Co. P. Ltd, has witnessed a sharp recovery during the year ending December 1987 from a setback it suffered in the previous year. The turnover of the company at Rs. 32.11 crores has registered an increase of 51 per cent over previous year. The company has earned profits before tax of Rs. 1.32 crores in 1987 as against a loss of Rs. 0.07 crore in 1986. It has raised the dividend to Rs. two per share from Re. one per share in the previous year

The profits for the year 1987 would have been still higher but for the change in the method of providing depreciation as reported in the annual report. The profits before provision for depreciation and taxation have been Rs. 5.32 crores in 1987, as against Rs. 2.34 crores in 1986. During the year under review, the method of providing depreciation has been changed to the written down value method with retrospective effect. Similarly, the depreciation on all additions to plant and machinery has been provided for the full year irrespective of the period for which they were in use. As a result, the depreciation for the year has reportedly increased by Rs. 1.63 crores (including arrears in respect of earlier years) which has reduced the profit for the year to that extent.

The major profitability ratios have shown an increase over those of the previous year. The gross return on total capital employed has gone up from 7.4 per cent to 11.5 per cent while gross return on net sales has been higher at 11.1 per cent than the 10.2 per cent of the previous year. The profits after tax as a percentage of net worth which was negative in 1986 work out at 21.0 per cent in 1987.

The company is engaged in the production of phthalic and maleic anhydrides. It has produced 18,274 tonnes of phthalic anhydride as against 14,321 tonnes in 1986 — an increase of 28 per cent over the previous year. The capacity utilisation has been estimated at 91 per cent as against 95 per cent in the previous year. The company also recovered 136 tonnes of maleic anhydride in 1987 as against only 90 tonnes in 1986. The foreign exchange earnings of the phthalic anhydride have been higher at Rs. 2.23 crores (on f.o.b. basis) than Rs. 1.62 crores in the previous year.

During the first five months of the current year (1988), the company has produced 8,600 tonnes of phthalic anhydride as against 5963 tonnes in the corresponding period of the previous year. The output of maleic anhydride has been 243 tonnes as against 31 tonnes in 1987. The turnover has also been reportedly higher than that in the corresponding period of the previous year. Thus the despatches of phthalic anhydride have been put at 8474 tonnes as against 5820 tonnes while the despatches of maleic anhydride have been 266 tonnes as against 31 tonnes in the corresponding period of last year.

However, the demand for phthalic anhydride from the plasticizer industry has been reportedly low in the current year due to various reasons. In order to keep the plant working in full capacity, the company has decided to export the surplus. However, according to the chairman of the company, the profit margin has been under pressure due to an increase in international prices of all petrochemicals.

The company has reportedly taken certain steps to revamp the existing plants with a view to further increasing production and reducing the cost of inputs, particularly energy. it also plans to enhance the capacity of maleic anhydride to 10,000 tonnes. An application has been made to the government for the import of capital goods for tne said project.

HERDILLIA CHEM TO SET UP NEW UNIT

Herdillia Chemicals which had planned the manufacture of ethylene propylene copolymers, EPDM) as its "divisional" activity has now decided to float a new company called Herdillia Unimers Limited to implement this multi-crore project, coming up in Maharashtia.

The company has also revised the project cost from Rs. 30 crores to Rs. 40 crores due to "cost escalation in equipment, upward revision in taxation rates on know-how payment, increase in the rate of customs duty on imported equipment, etc."

All these and the connected proposals of the company have been approved by the central government "in public interest".

The new project is being floated to manufacture 10,000 TPA of EPM/EPDM at the company's existing plant in Thane.

Of the total revised project cost of Rs. 40 crores, Rs. 13 crores will be equities — Herdillia Chemicals will contribute Rs. 6.20 crores: Uniroyal Chemicals Company of USA Rs. 1.30 crores and Rs. 5.50 crores will be issued to public.

The balance cost of Rs. 27 crores will be met by loans from banks and financial institutions Rs. 23.50 crores; foreign exchange loans Rs. 3.00 crores and Rs. 50 lakhs as unsecured loans subordinate to equity from Herdillia Chemicals.

There are a few changes in the original scheme of finance and one now sought to be implemented by the company. Earlier the company proposed to issue debentures worth Rs. 10 crores which has now been abandoned. Similarly the raising loans from FIs has now been increased to Rs. 23.50 crores as against Rs. 10 crores planned earlier and foreign exchange loan has also been revised from Rs. 2.50 cro-

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Highlights in Chemical Technology (Part 2)

ELASTOL -- A NEW POLYMER TO CLEAN-UP OIL SPILLS

An oil spill is one of the most bothersome forms of pollution posing one of the most difficult clean-up problem.A new polymer developed by General Technology Application (GTA) of Manassas, Va., promises to solve the problem. The new polymer increases the viscoelasticity of oil simplifying its separation from water. It can clean up oil spills in one-tenth the time previously required.

This product called Elastol is made by cryogenic grinding of high molecular weight polyisobutylene (PIB) manufactured by BASF. The PIB is pulverized at several hundred degrees below freezing. The resulting particles -- ranging from 100 to 1000 micrometers -- are coated with tricalcium phosphate and calcium stearate to obtain a non-agglomerating powder.

Elastol have been approved in both Canada and USA for cleaning up oil spills; while France and Norway will evaluate the same in 1988. A joint study by Canada's EPS and the US Interior Department's Minerals Management Service, moreover, showed that because of improved recovery rates, Elastol can halve the cost of cleaning up oil spills, vis-a-vis the conventional methods. By conventional methods the cost of cleaning up oil spills comes to $1300/bbl of oil. Further, since Elastol is made from the same food-grade PIB that gives texture to some chewing gums, it is reported to be environmentally safe. In contrast, most conventional emulsion inhibitors now used to clean up oil-spills are toxic to some degree.

The joint USA-Canada study has shown, that the oil spills can be cleaned up by Elastol even under most stormy conditions on the sea. Results showed that when Elastol was spread on the spill at concentrations of 600-6000 ppm -- or about 8 lb of Elastol for 7000 gal of oil --the oil separated from water. The separated oil formed a rubbery sheet that could be vacuumed or skimmed off from the water's surface. Skimming removed 93% of the oil without taking up any water and nearly 100% with some water present in the recovered oil.

The key to Elastols unique property of collecting oil drops lies in the hydrophobicity of PIB, as well as PIB's long narrow molecular shape. Thousands of oil molecules (also hydrophobic) form weak intramolecular bonds, called Van der Waals bonds all along the length of a PIB molecule. In turn, the bunch of oil molecules gathered around a PIB molecule form Van der Waals bonds with other bunches of oil molecules grouped around PIB molecules, strengthening the collection of molecules.

In the presence of water; as in an oil spill, the molecular collections which are actually microscopic oil drops, become even stronger. That is because, being hydrophobic, they are repulsed by water and are thus more strongly attracted to each other. As the microscopic oil drops collide with one another, new Van der Waals bonds form between them. Within minutes, all the oil droplets have come together to form a thin, rubbery sheet. Indeed, if more than 1% PIB is mixed with the oil, the Van der Waals bonds can be strong enough to even contract the oil spill.

Enthusiastic comments from environmental authorities indicate Elastol has indeed good potential in the cleaning up of oil spills round the world. (*Chem. Wk.*, 4/20/88, p. 53).

A NEW FAT SUBSTITUTE BASED ON ESTERIFIED PROPOXYLATED GLYCEROL

Arco Chemical reports that it has applied for a European patent (European Patent 254547) for its esterified propoxylated glycerol (EPG) a propylene oxide-based fat replacement for use as a liquid or solid in food products. That is in addition to patents pending for EPG in the USA and Canada. The company also has started to meet with the US Food & Drug Administration to outline the studies that will be required for approval of EPG as a food additive.

EPG is safe, non-caloric and an effective replacement for oil and fat. The company researchers have been testing EPG and has used it in mayonnaise, ice-cream and cake. A number of food companies in USA have shown interest in developing EPG for food processing. (*Chem. Wk.* 3/16/88, p. 94).

NOVEL JAPANESE SUPERCONDUCTOR BASED ON BISMUTH, CALCIUM, STRONTIUM & COPPER OXIDE

A group of Japanese scientists at the Science and Technology Agency's National Research Institute for

Metals in Tsukuba has recently reported a new high temperature superconductor composed of Bi-Sr-Ca-Copper oxide. The development is unique and unusual in that the new oxide based superconductor does not contain any rare earth.

The new oxide based superconductor when annealed for several hours at first under 900°C, shows an onset in reduction of resistance at 120K and zero resistance at 75K. But there is a very sharp drop to almost zero resistance betwen 101 and 105K. Therefore, Dr. Hiroshi Maeda of the Institute, whose group made the oxide-based superconductor, suspects that the new ceramic is composed of two phases, one with a critical temperature of 75K and the other about 105K.

Magnetic susceptibility measurement show clear evidence of the Meissner Effect. Interestingly, the oxide can be made to float in air when placed above a permanent magnet after soaking in liquid nitrogen. The oxide is black in colour but its crystal structure has not yet been determined.

All high Temperature superconductors found so far contain rare earth elements, such as yttrium and lanthanum. In fact Japan's MITI has been allotted about $1 million in its fiscal 1988 budget to assess world supplies of rare earth elements because there were fears that Japan's supplies of the elements might dry up when the new superconductors reach the application stage.

Some theorists suggest, however, that it is the presence of Cu-O planes or chains within the atomic lattice that is crucial for superconductivity. The result of the present discovery has been published in the Japanese Journal of Applied Physics. (*Nature*, 2/4/88, p 377)

A 50 PERCENT CHEAPER REFRIGERATION SYSTEM DEVELOPED BY MITSUBISHI HEAVY INDUSTRIES

A refrigeration system that costs 50% less to run than present heat pumps may soon find a warm welcome in chemical and food plants. A bench scale unit has been installed at Mitsubishi Heavy Industries Ltd.'s Takasago Research & Development Centre, under the Japanese Government's Moonlight Project to sponsor research in innovative, energy-saving technologies.

The system works by directly mixing a refrigerant, such as chlorofluorocarbon with water. The mixture freezes, forming a slurry of clathrate crystals with a sherbet like consistency. This is pumped to a storage vessel and used for cooling. MHI reports that the process uses less energy because clathrate formation elevates the freezing point of the mixture to between 5 and 8°C, compared with pure water, which has to be chilled to 0°C. (*Chem. Eng.*, 4/25/88, p. 17).

A LOW-DENSITY CERAMIC FIBRE STABLE AT 4200°F DEVELOPED

A low-density, ceramic fibre insulation that can be used upto 4200°F, more than 100°F higher than for conventiomal fibre structures, is being patented by Oak Ridge National Laboratories. The material known as ZZX-4200, is composed of zirconia-bonded zirconia fibres that are partially stabilized with 3-5 vol. % of yttrium. Oak Ridge reports it can be molded into porous composites for use in vaccum, inert and oxidizing environments, such as in high temperature furnaces, low-pressure combustors, heat exchangers and hot gas filters. The insulation will also make possible a new class of industrial process furnaces that can operate at 3650°F in oxidizing atmospheres, well above the current limit of 2800°F.

The thermal insulation efficiency of ZZX-4200 is maximized by a proprietory molding technique that ensures that the fibres are carefully oriented in a particular direction. This is said to reduce heat flow by a factor of two, compared with insulations made of homogenous materials or randomly oriented fibres. (*Chem. Eng.*, 4/11/88, p. 13).

THE AMERICAN FILTRATION SOCIETY MAKES DEBUT IN USA

The American Filtration Society (AFS) is born, pointing to the USA's growing interest in separation technology. An offshoot of the UK's International Filtration Society. AFS's first international conference held last March (1988) in Ocean City, Md., was a big success.

A key proposal at the meeting came from Roger de Bruyne, Chairman of the working party of the European Federation of Chemical Engineers, who called for the formation of a worldwide filtration federation that would serve as a forum for the exchange of technical information. (Chem. Eng., *4/25/88, p. 21).*

BATTELLE'S REPORT ON HIGH PERFORMANCE FIBRES MARKET WORLDWIDE

A worldwide evaluation of the rapidly growing high performance fibres industry is available in the form of a recently published report entitled "High Performance Fibres for Reinforcement of Composites".

During the two year, Battelle compiled and analyzed information on all commercially available high-performance fibres for the reinforcement of composites, which can

replace metals. Included are UHM polyethylene, aramid, carbon boron, silicon carbide and aluminium fibres. Also evaluated are carbon and ceramic whiskers and high strength and quartz-glass fibres.

Currently about two-third of the 16,000 tonnes annual world demand for high performance fibres has been supplied by aramid fibre, which until recently has been produced almost exclusively by Du Pont.

Carbon fibres which accounts for 20% of current demand is produced by more than 20 companies and high-tensile-strength glass fibre, with 12% of the market, is produced by three companies.

Battelle estimates that the annual world demand for high performance fibres will exceed 100,000 tonnes by the year 2000 AD. The Battelle report estimates changes in the market share as a result of shifts in areas of application and of development of new high-performance fibres and composite materials.

Specific information about each of the nine types of fibre included identification of producers and their capacities, description of process technologies and overviews of properties, applications, pricing, supply and demand and future development.

In conducting the study, Battelle researchers analyzed data from the USA, Western Europe and Japan. They also conducted field interviews with leading producers of reinforcing and matrix materials to obtain technical information on the nine fibres.

The price of the Report is exorbitantly high at $9000 per company. Only a few big companys and libraries can afford to purchase this Report. (*Refractories J.*, Nov./Dec., 1987, p. 19).

H_2O_2 PROVES AN EFFICIENT DETOXIFIER OF HYDROGEN CYANIDE EFFLUENT

A novel treatment process has successfully demonstrated the safe detoxification of water heavily contaminated with cyanide from the manufacture of HCN gas.

Interox Chemicals (Warrington, USA) working with researchers from National Smokeles Fuels treated 1.4 m. gallons of water at a coking works with 80 tonnes of 35% hydrogen peroxide. This reduced the levels of cyanide contamination to less than 0.1ppm from concentrations before treatment of more than 300 ppm. Hydrogen sulfide also present in the water was reduced to non-detectable levels.

Treatment involved direct injection of H_2O_2 into the contaminated water as it was pumped into the reaction tank, than into an activated sludge plant. Here specially cultured bacteria reduced concentrations of phenols and thiocyanate. The process was so effective that the purified water could be discharged into an open stream without harm to aquatic or human life. Besides making contribution to pollution abatement, a major benefit of H_2O_2 is that it does not contribute to the pollution load. (*Chem. in Britain*, 9/1987, p. 820).

A NOVEL RAG MOPS UP TOXIC PAINT SOLVENTS

Tighter occupational safety controls in solvents have caused problems for car manufacturers, whose paint shops use large quantities of organic solvents. The Fraunhofer Institute for Interface & Bwengineering in Munich, West Germany has developed a filter to remove solvents from drying chamber emissions, thus reducing health and fire hazards and allowing the solvents to be recycled.

Researchers at the above Institute have produced a composite semi-permeable membrane consisting of a thin layer of polydimethylsiloxane as the filter element applied to a permeable carrier membrane.

If vapours from the drying chamber are passed across the surface of the membrane while a low-pressure zone is maintained on the other side of the membrane, the solvent molecules will preferentially pass through it. The researchers report that the membrane is 200-times more permeable to solvents than to air.

Solvents like acetone, toluene, xylene, dichloroethane, trichloroethane and ethylene chloride can be removed with high degree of purity. Test runs at the car plant showed that the value of the recycled solvents fully makes up for the cost of the filter system. (*Chem. in Britain, 10/1987, p. 932).*

A TERPENE-BASED CLEANER TO REPLACE CHLOROFLUOROCARBONS (CFCs) AS CLEANING SOLVENTS

A terpene-based cleaner may replace chlorofluorocarbons (CFCs) as cleaning solvents for the electronics industry. The cleaner which contains no chlorine, was developed by Petroferm (Fernandino Beach, Florida) and has been tested at AT & T's production facilitty.

According to spokesmen for Petroferm and AT & T, the cleaner is biodegradable and safe to handle and surfactants enhance its cleaning efficiency. Currently however, the solvent can be used to clean only those electronic products that can be immersed in water during manufacture. The new solvent is expected to

reduce industry consumption of CFCs, which are now used to remove solder and flux material from circuit boards.

In 1986, for example, AT & T alone consumed about 1.4 million Kg. of CFCs. Substitutes for CFCs are being sought because these compounds are blamed for destroying the Earth's stratospheric ozone layer and it is expected that CFC use eventually will be restricted and prohibited. (*ES & T*, 3/1988, p. 238).

SEVERAL NEW CONDUCTING PLASTICS (POLYMERS) ON THE HORIZON

Plastics capable of conducting electricity are ready to come out of laboratory, but as yet they have no serious commercial applications. At the Royal Society of Chemistry's annual congress last April a senior researcher of BASF reported that the company has developed a new generation of electrically conducting polymers that could be incorporated in mini batteries or used for storing data. Researchers at BASF's Plastic Research Laboratory in West Germany have chemically modified two conducting plastics, polyacetylene and polypyrrole, to produce materials that can be bent, stretched or rolled into thin films that look like black tissue paper.

The material has polymer chains which tend to be in the same direction. This means they retain a high level of conductivity -- 2000 siemens per centimetre. This development represents a major technological breakthrough in the drive to make conducting plastics for practical applications. For the last 10 years researchers in Japan and USA have been endeavouring to produce a conducting plastic that could be made on a commercial scale. Until now they had failed to produce a plastic that could be processed. The polyacetylene and polypyrrole they made were brittle materials that were impossible to mould.

The researchers at BASF working under Herbert Naarinann have overcome this problem by changing the structure of the two polymers slightly. They have added large chemical groups often with a ring-like structure at random positions in the polymer chain using a process called cyclo addition. This modification transforms the polymer into a material that is easy to process. BASF has already developed a process for making the modified polypyrrole (the plastic most favoured to reach the market place) in continuous sheets, which according to Naarmann can be bent and folded many times without breaking.

Small pieces of the material could be used to form the electrodes of a lightweight flat battery. The plastic should also provide an effective method of storing data permanently. A laser of the appropriate wavelength can write information directly on the plastic by destroying its electrical conductivity where the light impinges on the surface.

BASF has also produced a series of novel conducting materials by depositing polypyrrole on nylon fabric, glass fibre and teflon. The company has even produced a transparent film, by coating the polyphenylsulphone with polypyrrole. Many potential applications are possible for this highly stretchable polypyrrole rubber as an electrical conductor.

BASF is as yet not quite sure what to do with the conductive rubber or any of its other products. The researchers have ideas and they are looking for outlets. The company is currently asking industry to suggest potential applications for the material. (*New Sci.*, 11/21/88, p. 35).

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Reverse Osmosis and its uses in Industrial Water Application

PHILIP A. BARDSLEY
Du Pont (UK) Limited, Hemel, Hempstead, Herts, U.K.

SUMMARY

The use of Reverse Osmosis technology for desalination of water for industrial applications is often a more cost effective process than competitive processes such as ion exchange and electrodialysis. Reverse Osmosis can be used to produce high purity water and ultrapure water for boiler feed, pharmaceutical/biomedical and electronics industries and to treat effluent waters. It also has use in the electroplating and electropainting industries.

CONTENTS

1. Technical Principles of Reverse Osmosis
2. Reverse Osmosis Devices and Membranes
3. Du Pont PERMASEP* Permeator Product Line
4. Design of Reverse Osmosis System using PERMASEP* Permeators
5. Industrial Applications of Reverse Osmosis.

Technical Principles of Reverse Osmosis

Reverse Osmosis (RO) can be thought of as a filtration process at the molecular/ionic size level. It utilises a semi-permeable membrane, meaning that the membrane permits the passage of solvent in either direction, but retards the passage of solute.

Normal Osmosis is the natural process by which water flows through a membrane from pure water or from a dilute solution into a more concentrated solution. Every solution has a specific osmotic pressure which is determined by the chemistry and concentrations of the dissolved material. This flow continues until the resulting osmotic head equals the osmotic equilibrium, and the net flow of water across the membrane is zero.

If the solution compartment is enclosed, and a pressure higher than the natural osmotic pressure of the solution is applied to it, the direction of water flow is reversed. The solution becomes more concentrated, and purified water is obtained on the other side of the membrane. Hence the term reverse osmosis.

The rate of flow of purified water depends on various factors: the chemical nature of the membrane itself, the membrane thickness, area and temperature. Under any set of fixed conditions, product flow is proportional to the difference between applied pressure and the osmotic pressure of the solution. The small amount of dissolved material passing through the membrane, on the other hand, is **not** pressure dependent. It depends instead on the difference in concentration of the two solutions on either side of the membrane.

$$QW = f(\Delta P - \Delta \Pi)$$
$$QS = f(\Delta C)$$

Two common terms used in discussions of RO are "salt passage" and "conversion". "Salt passage" is the amount of material in the purified water, expressed as a percentage of the concentration in the solution. If the solution contains 1000 ppm (mg/l) of sodium chloride and the purified water contained 60 ppm (mg/l), the salt passage is 6%. The term "salt rejection" is also used, it is simply 100% minus the salt passage. "Conversion" is defined as the percentage of solution which is recovered as purified water.

$$Sp = \frac{Cp}{Cf} \quad (\times 100\%)$$

$$Y = \frac{Qp}{Qf} \quad (\times 100\%)$$

Within a very simple schematic reverse osmosis system, the solution, or feed, is pumped into a pressure vessel containing the membrane. Purified water, called permeate or product water, is recovered at atmospheric pressure. The pressurised concentrate, called the brine or reject, is let down to atmospheric pressure through a flow regulating valve. In an RO system, however complicated, a final regulating valve controls conversion.

Some of the implications of these basic elements of reverse osmosis in the treatment of a feedwater should be considered:

For further information on the products mentioned in this report please contact Mr. Purvez Boywala, Consultant to Du Pont Far East Inc., 5/5B, World Trade Centre, Cuffe Parade, Bombay 400 005

* as conversion is increased, so is the concentration of the brine and the osmotic pressure. The average osmotic pressure of the feed brine must be overcome in order to produce a permeate.

* Increase in brine concentration also results in increased salt passage and poorer product quality.

We can conclude from these obversations alone that we shall need devices to operate at suitably high pressure and that there will be physical limitations to conversion. Pressures used are in the range of 15-80 bars depending upon the salt content of the water and temperature.

Reverse Osmosis Devices and Membranes

Permeate flow is directly proportional to membrane area and inversely proportional to its thickness. Therefore in designing an RO device, it is obviously desirable to package the greatest possible area of the thinnest possible membrane per unit volume of the device.

Devices

One of the earliest RO devices was referred to as a plate and frame device and some of these are still being manufactured. The membranes are mounted on opposite sides of the plate and are sealed to the plate. Pressure is applied to the salt water on the outer side of the plate, and the product water is forced through the membranes into the interior of the plate at low pressure.

The interior of the plate must be either porous or have hollow channels through which product can flow to a collecting point. Compared with other RO devices, plate and frame systems contain more membrane surface area for the volume of the pressure vessel required. Therefore a large building area is required to house sufficient devices for a particular application.

In the tubular devices, the semi-permeable membrane is either inserted into or applied as a coating on the inside surface of a porous tube. The tube is designed to withstand the operating pressure. Salt water under pressure is introduced into the end of the tube.

The product water permeates the membrane and the tube collecting on the outside -- the brine exits from the far end of the tube. The tubes are large enough to permit most liquid solutions to pass through. They can be cleaned easily and frequently but are not suitable for large scale water treatment applications because they contain a small membrane area per unit volume.

Of the many device designs that have been tried, tw have been the most extensively developed and are use widely in practice. These are the spiral wound cartridg and the hollow fine fibre devices. The construction c a spiral wound bundle uses membrane in the form c a flat film. A sandwich is constructed of membrane o both sides of a porous backing. This sandwich is seale on three sides and a fourth side is sealed to a slotte collection tube. Then a loose woven spacer is laid o one side of the membrane sandwich and the whole thin is rolled up into a spiral wound roll. A number of thes cartridges, usually up to six, are placed end to end wit proper spacers in a long cylindrical pressure vess commonly approximately six metres long. The flow c pressurised feed is usually in the transverse direction Permeate flows through the membrane into a backin and travels a spiral path to the centre collecting tube an is taken off at one end of the pressure tube. The fee continues on, becoming increasingly concentrated as passes to the other end of the pressure tube as brine

Du Pont first commercialised an RO permeato designed on hollow fine fibre in 1970. Electron micro graphs show that although only as thick as human hai the spun fibres are nevertheless thick-walled pipes From an engineering point of view it is able to withstan high pressures. When show in section, the fibres i "asymetric" because it has a very dense skin on the ou side, which is the contact surface for the feed. The ski retards the passage of salt but permits flow of wate Under this skin is a porous structure of the same chem ical composition which provides support strength. Flo of permeate is from the outside into the core of the fibre

A very simple schematic drawing of the general con struction and flow pattern in a PERMASEP* permeato shows that it resembles a shell and tube heat exchange Feed under pressure enters at the left through a non porous tube in a plenum chamber and into a bundle con sisting of millions of hollow fine fibres in parallel an sealed at both ends. At the left, an epoxy "nub" give the bundle mechanical stability and provides an annu lus for flow of concentrate. At the other end of the bund the fibres are also potted in epoxy, to form a tube shee

There, the surface is machined to open up the end of the fibres. A micrograph of the surface of the tub sheet shows the potted fibre ends. At the centre of th bundle is a porous distributor through which feed flow radially. As it contracts the outside of the fibres, perme ate flows to the centre of each fibre and moves to th right out of the phase of the epoxy pot and out of the pe meator. The concentrate is forced back to the left of th nub, into the plenum chamber and out of the permeate

Membranes

The key to developing a commercial reverse osmosis permeator is to find a specific membrane that will endure good reliable performance. Important properties for evaluation during membrane development are salt rejection, flow, durability, chemical resistance, biological resistance and cost. Du Pont have evaluated hundreds of polymers as candidates for PERMASEP* permeators and although the first commercial permeators contained membranes of cellulose acetate (CA) and its derivatives, Du Pont selected for its first PERMASEP* permeator an aromatic polyamide (aramid) membrane. The balance of properties in the aramid membrane offers more advantages than other membranes. Both CA and aramid membranes are asymetric with the rejecting layer skin and the supporting layer made from the same polymer i.e. cellulose acetate or aromatic polyamide. Overall, the ability of the two membranes is similar although specific ion rejections can be different under certain conditions. The greatest advantage of the aramid membrane is its durability.

Recognising the potential advantages of synthetic membranes, suppliers of cellulose acetate membranes as well as new membrane research firms supported aggressive research programmes to develop new synthetic membranes. At a membrane separation conference, one manufacturer reported "among the most promising materials for membrane applications are an expanding family of aromatic polyamides, polyimides and other nitrogen-containing aromatic -- backbone polymers. These materials are destined to dominate the reverse osmosis scene for some time to come because their transport, mechanical, thermal, biological and chemical properties are generally superior to those of cellulose acetate.

The most common synthetic membranes besides Du Pont's homogeneous aramid fibres are a class of membranes called thin film composites. The finished membbembrane consists of a very thin film cast or coated on top of the thicker supporting film. Such a multi-layer construction is difficult to manufacture. The various layers must be bonded to remain together under all conditions and cross-linking chemical reactions are sometimes used to achieve the desired result without embrittling the films. These devices provide more of the desired qualities, such as pH range required for general purpose membrane systems than cellulose acetate but long-term mechanical durability has yet to be demonstrated.

Design of Reverse Osmosis Systems using PERMASEP* Permeators

In its simplest design, a reverse osmosis system consists of a pumped pressurised feedwater, a permeator, and a flow regulating valve on the brine outlet to control conversion. A typical RO plant uses this basic design in modular form to achieve the desired capacity and water quality.

Feedwater enters the system through the inlet valve and flows through the cartridge filter to the high pressure pump. From the high pressure pump, the feedwater flows to the feed inlet connection of the permeator. Two water streams are shown leaving the permeator. The product stream should leave the permeator at essentially atmospheric pressure as any back pressure in the product stream from the permeator would reduce productivity. Brine leaves the outlet connection at a pressure close to the feed pressure and the pressure drop across the permeator from the feed inlet to the brine outlet will usually be of the order of 35 - 150 kPa. The brine flow rate is controlled by the brine flow control valve.

Most systems require more than one permeator to produce the desired quantity and quality of prouct water. Three basic permeator arrangements have been developed to solve most desalting problems:

* Parallel Staged
* Brine Staged
* Product Staged.

PERMASEP* Permeator Product Line

Configuration	B-10 / HFF	B-9 / HFF	B-15 / SWC	C-1 / SWC
Membrane	Aramid	Aramid	Aramid	CA
Operation Range (Tds/mg/l)	10,000-60,000	150-10,000	200-15,000	150-10,000
Salt Rejection (Min)	98.5	90.0	95.0/96.0	95.0/97.0
Salt Rejection (Av)	99.0	N/A	96.0/97.0	96.0/98.0
pH Range (Const. Op)	4-9	4-11	4-11	4-6.5
Temp. Range (°C)	0-40	0-40	0-45	0-40
No. Available Modules	3	5	4	5

The nature of the feedwater and product water quality specification will dictate which arrangement is required.

Industrial Applications of Reverse Osmosis

PERMASEP* permeators are widely used in water treatment applications worldwide. They range from small single permeator systems furnishing water for research facilities to multi million gallons per day municipal installations producing potable water for entire communities. In some cases, reverse osmosis is the whole water treatment process, in other cases where the end user requires a higher quality water than can be produced by reverse osmosis alone, other treatment methods are used in conjunction with the PERMASEP* permeator system. PERMASEP* permeator applications fall into three major areas: potable, industrial and commercial.

If we look at industrial applications, PERMASEP* B-9, B-15 and C-1 permeators are used worldwide by industrial firms to produce water for many applications including boiler feed, rinsing electronic components, electroplating and chemical, food and pharmaceutical processing.

The electronics industry requies ultrapure water (eg. 18 meg-ohm) for rinsing components such as silicon chips for microprocessors. Invariably, the available raw water tds is only a few hundred parts per million so reverse osmosis is used primarily to remove very small organics and colloids and particles from the rinse water which would otherwise reduce the yield of microprocessors. The RO product water is usually polished with mixed-bed demineralisers to obtain water of satisfactory quality. Reverse osmosis plus ion exchange (IX) together are very cost effective for this type of system compared with ion exchange alone.

Electric utilities and industries such as oil refining and petrochemicals which generate their own power, normally require very good quality water for high pressure steam boilers. Reverse osmosis followed by mixed-bed demineraliser polishing is frequently used instead of large individual cation and anion exchangers. The cost of an RO system is justified by eliminating regeneration chemicals and associated waste disposal problems. For low pressure boilers, RO alone or in combination with sodium softening is frequently an adequate water treatment.

Industries such as chemical processing, pharmaceutical and pulp and paper need consistent water quality and/or low tds processed water that cannot be obtained from normal sources. B-9 PERMASEP* permeators have been used worldwide to supply good quality water for these applications and the new B-15 modules are being accepted for similar applications. Permeators have been used to remove colloidal materials, organics and pyrogens from de-ionised water streams. For these applications, the pH of the system must be carefully controlled and for de-ionised water with less than 10 mg/l tds (as ion) the pH of the feed brine and product streams must be greater than or equal to 7.

Many PERMASEP* B-9 permeator systems are used for purifying rinse water from electropainting lines. Typically the feed streams have a pH of 9-10 and the constituents include polyacrylic resin, isopropyl alcohol, butyl cellosolve, methanol, acetone and/or triethylamine. Both the brine and permeate are re-cycled back to the painting lines.

Reverse osmosis can also be used in electroplating operations, e.g. in the recovery of copper sulphate and copper cyanide. PERMASEP* B-9 permeators are being used for the closed-cycle recovery of nickel salts from the rinse water of nickel plating operations. Plating and metal finishing are a specially attractive application of RO because of the excellent rejection of heavy metals. Operating costs are typically 1/20th of those for conventional thermal processes.

RO technology is now being extended to uses in the photographic industry and in the treatment of waste waters. (* Du Pont Registered Trade Mark)

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Ethyl Silicate	: 10 MT	Lithium Metal	: 100 Kg.	Maleic Anhydride	: 1 FCL
Iso Octane	: 1 MT	Lithium Aluminium Hydride	: 100 Kg.	Sorbic Acid	: 1 MT
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Cobalt Oxide	: 1 MT	Di Methyl Acetamide	: 1 FCL	Gallic Acid	: 1 MT
Dicyanodiamide	: 5 MT	Octoic Acid	: 5 MT	Hydroxylamine HCl	: 5 MT
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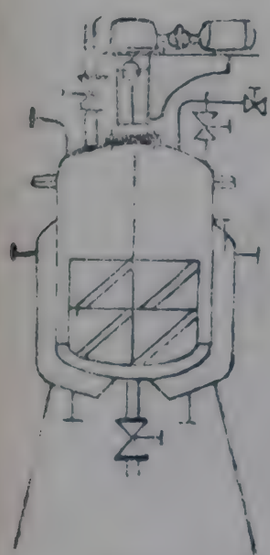

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Chemical News from Abroad

HYDRO PLANS TO CLOSE FRENCH AMMONIA UNIT

Norsk Hydro's French subsidiary Cofaz is to close its 250,000 ton/year ammonia unit at Pierrefitte in south west France with the loss of 150 jobs. Cofaz, recently renamed Norsk Hydro Azote, says the rationalization is a vital part of its struggle back to profit.

The company said the plant was being closed because it was old and no longer competitive and that jobs would disappear through natural wastage. The closure represents around 25 per cent of Hydro's ammonia capacity in France.

Further scheduled closures included three units for the production of nitric, sulphuric and phosphoric acid at Ambares. The NPK granulation plant at the same site will not be affetecd. The closures will coincide with the planned start-up in autumn 1990 of Hydro's ammonium nitrate complex at nearby Ambes. The new unit includes capacity for 1,150 ton/day nitric acid and 1,500 ton/day ammonium nitrate. Norsk Hydro Azote has selected sister company NSM of Belgium to carry out basic engineering work on the plants. NSM technology will also be used at the facility while the contractor is believed to be Krebs.

The Pierrefitte closure comes at a time when Europe's fertilizer manufacturers continue to face tough times. ICI chairman Denys Henderson recently warned that total world capacity for ammonia still ran some 3.3m ton in excess of demand.

Rationalization plans for Hydro in France have involved a number of cuts in the workforce. In 1986, the number of employees stood at nearly 3,000. This has been reduced to around 2,300 at present and further job losses will take the total down to 1,850 by 1991.

Cofaz managed to cut back losses of FF383m in 1986 to FF276m last year.

GADOT IN CITRIC ACID DEAL

Gadot Petrochemical Industries of Israel is at an advanced stage in talks to acquire Italian citric acid producer Biacor SpA.

The Italian company, which is believed to have been on the market for around two and half years, is a leading producer of citric acid with a 25,000 ton/year facility based in the north of the country near Pavia. Sales of the product are estimated to be well in excess of $30m/year.

Biacor also produces monosodium glutamate. Its 20,000 ton/year plant at Rovigo, also in northern Italy, was temporarily closed in 1987 but resumed production earlier this year.

Gadot already manufactures citric acid at a plant acquired from Miles Laboratories in 1982. The company did not disclose capacity figures but said the unit was "very profitable."

The acquisition comes as Gadot moves into a new phase of activity. Major expansion plans, detailed in recent ECN, are due to be put into action once the company's new shareholders, Clal and Delek, are in place.

ENICHEM FLUORODERIVATIVES JV

Italy's state chemical company Enichem has formed a fluoroderivatives joint venture with Mitsubishi Corp of Japan. Called Miteni, the venture anticipates an annual turnover of £40bn ($31 m). Enichem stands to benefit from access to markets in the Far East and South East Asia. While Mitsubishi strengthens its position in fluoro and benzotrifluorine derivatives.

Through Enichem Synthesis, the Italian group will control 51 per cent of the new company, with Mitsubishi holding the remaining stake. In setting up the business Miteni has acquired Mitsubishi's Italian fluoroderivatives concern Rimar Chimica SpA, which has annual sales of £22bn. Miteni will also acquire the Enichem Synthesis fluoroderivatives division, making the venture the third largest in Europe. Hoechst and Rhone-Poulenc. The market for these products is growing by 10 per cent/year.

ENI, MONTEDISON PACT

Negotiations are under way as to which core business will be included in the independent concern to be formed by the Montedison/Enichem link up. Products discussed are said to include fibres, fertilizers, pesticides, some plastics (including probably PVC from the EVC joint venture with ICI) and petrochemicals and various intermediates.

Eni and Montedison will each hold a 40 per cent stake in the venture for three years and the banks the rest. Current talks are aimed at singling out the assets, financial potential and debts that will be turned over to the joint concern.

The most likely candidate to head up the new venture is Lorenzo Necci, currently head of Enichem. However an outsider has not been ruled out.

HERCULES RESINS RESTRUCTURING

Hercules has nearly completed a $60m restructuring programme covering its resins business worldwide. The US group has just started up a 10,000 ton/year expansion of its resin derivatives plant at Hattiesburg, Mississippi. Other projects completed include a $30m modernization of its pale wood resin plant in Burnswick, Georgia, debottlenecking of its resin derivatives plant in Middelburg, the Netherlands and construction of a 25 000 ton/year aliphatic hydrocarbon resins plant in Jefferson, Pennsylvania

To reinforce its research drive, Hercules is also building a new technical centre at its Jefferson plant.

After a poor start to the decade, Hercules's resins business is now growing faster than many user markets. Last year the business posted sales of $340m up 10 per cent on 1986. Total resins capacity worldwide is over 110,000 ton/year.

HICKSON ACQUIRES U.S SULPHUR CHEMICALS FIRM

Hickson International, the UK timber treatment and chemicals group, is paying $24m (£12.9m) for an 80 per cent stake in US-based sulphur products manufacturer, Kerley. The deal both extends and consolidates Hickson's inorganic chemicals activities in the US currently based with Pitt Metals & Chemicals of Pittsburgh. Kerley will add sales of $42m-plus to Hickson's existing US turnover of around $30m/year.

Based in Phoenix, Arizona, Kerley makes and markets a range of sulphur-based products using oil refinery waste sulphur streams, The products are used mainly in the US by agriculture, mining, photographic and paper industries.

According to Hickson, around $27m in sales comes from Kerley's agricultural chemicals. These include ammonium thiosulphate (ATS), a sulphur supplement added to liquid fertilizers, and ammonium polysulphide (APS), an additive for alkaline soils with poor water retention. Kerley is the only US producer of APS and has a 65 per cent share of the ATS market. Mining chemicals, mainly sodium hydrosulphide which is a flotation aid used in copper extraction, account for sales of around $10m.

According to Hickson's managing director John Marvin Kerley complements the group's existing inorganic product lines manufactured by Pitt in the US and William Blythe in the UK. He believes there is good synergy and expects to sell Kerley's products in markets such as the EEC and UK.

Hickson which is based in Castelford, West Yorkshire, had total sales of £224m in 1987. Of this, some £87m turnover came from chemicals. William Blythe, the group's inorganics arm which makes tin and sulphur chemicals, had turnover of £27m.

According to Marvin, Hickson is also looking to make an organic chemicals acquisition in the US. The group has already established its timber business in North America.

UCB CLINCHES DEALS IN JAPAN

Belgium's UCB has signed two separate agreements which will boost the firm's business in Daicel Chemical Industries, will create a Japanese joint venture to sell uv-cured resins. The other agreement, with Sumitomo Pharmaceutical Co., is for the joint development of UCB's anti-allergy drug, cetirizine.

With Daicel, UCB will own 55 per cent of a joint venture expected to begin operations in July. Called Daicel-UCB Co. Ltd., the new venture will first sell, and later produce, resins cured by ultra-violet light and by accelerated electron beams.

Daicel, with sales of $918m in 1987, makes speciality chemicals, films and propulsion systems. It is currently developing a range of high value product areas including drugs, biotechnology and agrochemical.

Separately, the Belgian firm has signed an agreement with Sumitomo Pharmaceuticals Co. for the development of its anti-allergy drug cetirizine.

The drug, which is marketed as zyrtec, has been developed through UCB's own research and is currently being launched in Belgium where it is produced.

Details of demand and the potential market were not available. A company spokesman said the drug was still very new. Under the terms of the agreement, Sumitomo will develop the product for its registration and launch on the Japanese market in co-operation with UCB Japan's drugs subsidiary.

Meanwhile, UCB denies that it may sell all or part of its specialty chemicals business to RTZ Chemicals of the UK. A spokesman said UCB intends to develop this

Chemical Markets Abroad

STOLT BUYS OUT PARTNER, DOUBLES HOUSTON STORAGE

Stolt-Nielson has improved its positions as an integrated chemicals transporter and distributor by buying out Oiltanking's stake in the two companies' port of Houston joint venture. Further, Stolt is investing $10m to double its terminal facilities at the port and early in 1989 the company says it will have 60 tanks for chemical and vegetable oils, giving a total storage capacity of 800,000 barrels.

By owning and expanding the terminal, Stolt plans to develop its "owner's berth" concept, in which the company's tankers have their own terminal. As well as avoiding docking fees, Stolt intends to improve handling and consequently cut down the time spent by vessels in port.

The terminal, which has been renamed Stolthaven Houston, will be a focal point for collecting cargoes, transfering products to and from vessels and also for onward distribution. Currently, 2m ton/year of chemicals and vegetable oils pass through the terminal, making it Stolt's second most important site after Rotterdam, and an important link to and from the US chemicals market.

The expansion of facilities will increase Stolt's stake of business handled at Houston from 4 to 7 per cent. The company adds that it is a small player at the port, and doubling chemicals capacity will only increase storage availability by 5 p.c. overall. Demand speciality chemicals storage has picked up recently at Houston and is growing by around 3-4 per cent/year. If the terminal is successful, the company has an agreement to obtain additional land for further expansion.

Stolt struck up its 50/50 joint venture with Oiltanking in 1982. At the time $10m was raised for building tanks and the related infrastructure. Oiltanking has decided to concentrate on petroleum storage and handling.

Stolt Tankers and Terminals operates more than 55 parcel tankers, totalling 1.4m tons deadweight, on trade routes around the world.

TOTAL START-UP UNSETTLES XYLENES

Just over a month after the start-up of Total's new isomerization unit in France, the European solvent xylenes market is beginning to feel the first effects. Market players said the unit would have little impact in the currently dull market, but there are now signs that distribution margins could be looking up for the first time in a year.

According to Pierre Marciac, commercial director at Total, the new unit will reduce solvent xylenes output by between 80-90,000 ton/year although the company will still be putting some 30,000 ton/year onto the French distribution market.

It terms of pure economics, observers say this is bound to lift solvent numbers in the marketplace. Solvent distributors, however, while acknowledging that prices are rising, say they do not hold out much hope of

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profit improvement this year. In the Netherlands prices range between Dfl.60-61/kg and in West Germany around DM54-57/kg.

Total originally planned to start the isomar unit at the end of 1987 but minor technical difficulties delayed start up until April 29. The company hopes the new unit will strengthen its position in the European paraxylene and orthoxylene markets.

Para and ortho output from the Gonfreville site will be almost doubled with para production increasing from about 50,000 ton/year to 90,000 ton/year and ortho from 45,000 ton/year to the same volume. Total will have to buy more virgin xylenes to feed the unit but the company has been stockpiling product for some time and has not been buying on the market.

European solvent and virgin prices have been moving up since the new year. In January solvent xylenes were fetching $235-240/ton and virgin $240-245/ton but a series of aromatics shutdowns in Europe and some optimism regarding the Total start-up has lifted prices since to $290-295/ton for solvent and $295-300/ton for virgin.

ARCO COMMISSIONS PO/GBTA PLANT

Arco Chemical has formally commissioned a $340m propylene oxide/tertiary butyl alcohol (PO/GTBA) unit at Fos-sur-Mar in France. The plant will produce 150,000 ton/year of PO and pushes Arco into number one slot in the PO supply stakes.

The plant, which will also produce 360,000 ton/year of GTBA and 50,000 ton/year of propylene glycol, is Arco's fifth PO facility and will serve export markets in the Middle east, North Africa and Southern Europe as well as domestic demand

Arco's sixth PO facility, a joint venture PO/styrene unit at Ulsan in Korea is due for completion in 1990. The company is also due to start up a 420,000 methyl tertiary butyl ether (MTBE) plant at Fos at the end of this year.

OPTIMISTIC OUTLOOK FOR CHLORALKALI BUSINESS

Chloralkali Producers have seen a dramatic turnaround in fortune over the past year. The overcapacity problem of the early 1980s has given way to an outlook of several years' good supply/demand balance and healthy plant operating rates.

Speaking at UK consultant, Tecnon's first chloralkali conference in London recently, Charles Fryer said there may even have been some overshoot in capacity reduction with most units in the US, for example, now operating at over 100 per cent utilization. The former Du Pont-Alcoa unit at Corpus Christi which was closed just two years ago has been acquired by Occidental and was recently reopened.

According to Tecnon, utilization rates rose from 83 per cent in 1986 to 85 per cent in 1987 Although Fryer concedes that this seems low for an industry in which production is currently sold out it is because plants are not expected to run fully all the time but to use interruptible supplies such as off-peak power from public utilities.

Utilization rates will also tend to be low if producers operate a "make-or-buy" policy. High power costs often mean that chlo-

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rine is imported in the form of derivatives but chloralkali capacity is kept available for strategic reasons to guard against shortages or inflated pricing. There is also the ever-present problem of getting the chlorine/caustic balance to match. Often a pulp producer, for example, might be forced to turn down caustic production in the absence of a suitable chlorine sink.

Fryer argues however that the utilization rate of 85 per cent means there is a degree of buffer capacity present to meet future growth and thus avoid the industry moving back to overcapacity. "Much of the new capacity will result from plant optimization rather than new facilities, and we see average utilization rates rising to 88 per cent by 1992," he said.

In addition, chloralkali plants are highly capital intensive — not only for the basic cost of the associated units needed to absorb excess chlorine. Fryer reckons that the cell cost can be less than 25 per cent of the total required for a greenfield investment. As a result, few new plants are planned. It is possible, he argues, that some new projects could emerge for countries such as India or Iran for import substitution. At the moment, even plants which buy relatively expensive power at 5.2 cents/kWh are operating at a high margin, Fryer observes.

He warns, however, that historically US caustic soda export prices indicate a seven year cycle. "Only in the last few months have electrochemical units (ECU) reached a level which producers consider adequate to cover reinvestment costs," he stated. "They would need to be convinced of the permanence of this recovery before sanctioning new investment, although the reactivation of the Corpus Christi plant shows that one producer is confident the recovery is not a seven day wonder."

A figure of $350/ton has been widely quoted as the ex-plant price for the electrochemical unit (1 ton chlorine, plus 1.3 ton associated caustic) needed to cover reinvestment costs for plants taking power from public utility. Some producers do have much cheaper sources of power. Niachlor, for instance, which is close to hydroelectric sources buys power at around 1 cent/kWh.

The surpluses and deficiencies of chloralkali in various regions of the world give rise to substantial intercontinental trade flows. Regions with a surplus in caustic are usually those requiring chlorine for chemicals production. Those in deficit are usually mining and refining areas, particularly those extracting aluminium from bauxite. Large flows of caustic occur to alumina plants in Jamaica, Guinea and particularly Australia, where the four major alumina producers together consume around 800,000 ton/year of dry product.

Developed country caustic end use (per cent)

Inorganic chemicals	20
Organic chemicals	17
Soap and detergents	4
Pulp and paper	14
Alumina	6
Rayon and cellophane	4
Neutralization	12
Water treatment	1
Other	21

Source : Tecnon

Fryer believes that any future investment in chloralkali plants is likely to be in the Pacific Basin in Taiwan or Korea for export to Australia, or in Australia itself.

Caustic will see slightly higher growth than chlorine, at 2.35 per cent/year against 2.15 per cent/year, with only the PVC and phosgene outlets for chlorine showing any dynamism. Other chlorine outlets, such as CFCs, pulp and paper are under attack for environmental reasons and are destined for low growth, he believes.

In contrast, none of the outlets of caustic is under threat, Fryer notes, although there could be some substitution by soda ash.

The pulp and paper industry can use soda ash as a neutralizing agent for example. Soda ash at $100/ton begins to become competitive if caustic prices go above $170/ton. If caustic rises to $200/ton above soda ash then there is an incentive for alumina producers to install facilities to convert soda ash to caustic soda. Free market forces will continue to drive up caustic prices, says Tecnon consultant Doug Hutchison. Although price trends have shown there is a seven year cycle before prices drop, Hutchinson suggests there are grounds for believing the current caustic shortage will be longer lived. Already the tight supply is very evident in the deepsea markets — consumers are paying close to $600/ton spot material against as little as $30/ton in 1986.

In the European Market

Naphtha prices have lifted to $166-169 ton while the crude market has remained steady. However, slackening demand from the chemical industry could drag levels down.

Ethylene prices have moved up unexpectedly after BP bought a 1,250 ton parcel from Atochem at $510/ton cif NWE. However, prompt deepsea spot material is still unobtainable and supplies from Libya, which were expected later this month, have been further delayed with a problem at the loading terminal at Ras Lanuf. As a result, European supply remains overstretched and small spot deliveries from the ARG pipeline are now fetching over DM1,100/ton.

Propylene has firmed to DM-640-660/ton cif NWE in an active market. Shell bought two 1,500 ton parcels at DM640/ton and DM670/ton cif for shipment to the US although other buyers seem to be holding off for lower numbers.

Butadiene prices are still climbing both in NWE and the US. Deals have been confirmed into the UK at $630/ton and $365/ton fob, but producers are already reluctant to sell product below $380/ton fob. US spot prices are currently around 23-23.5 cents/pound and June contracts have now been settled at 22 cents/pound.

Benzene prices have slipped to $285-295/ton as excess supply in Europe continues to dampen the market. Deals were done at $287/ton and $288/ton and one trader is said to be looking for material at $280/ton. Market sentiment however is looking up prompted by new US levels of $1.03-1.05/gallon.

In an otherwise quiet week, toluene has provided the market with some lively offers and bids. Numbers dropped to $233/ton at one point but buying by blenders lifted levels to $240-250/ton. Although this is still some way below last week's prices, increased gasoline demand in the US coupled with supply shortfalls from the Shell Norco cracker are buoying enquiries. Sources suggest that gasoline will be shipped in blended form soon to the US where prices are 83-85 cents/gallon.

Although there is still interest in paraxylene from the Far East, India and the US, prices have dropped to $570-590/ton.

Demand for orthoxylene remains healthy and prices have held at $320-330/ton. BASF is understood to have bought part of the 3-4,000 ton parcel of Soviet material at 320/ton fob while the rest was sold to the Far East for re-export.

After a stagnant period at the end of last week styrene prices have moved down to $1880-1900/ton for T1 and $1895-1915/ton for T2 with some methodical buying by co-producers.

Planned and unplanned shut downs dominate the methanol market this week. From the USSR and Far East to the US, plants are down and world supply is tightening. T2 prices have risen slightly to DM320-330/ton reflecting this and demand from the chemical industry for formaldehyde and derivatives continues to be strong.

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WEST GERMAN AGRO-CHEMICAL FIRMS SLAM NEW EEC RULES

West German crop protectants producers have criticized the new EEC limits for agrochemical residues in drinking water, which have been set at 0.1 micrograms per litre and are scheduled to come into effect on October 1, 1989.

"All efforts by manufacturers to produce less toxic products with better biodegradability have been wiped out by this new regulation," the industry association, Industrierband Pflanzenschutz (IPS) said in Frankfurt.

The association believes that it will not be possible in all cases to comply with the limits, which IPS claims are "five to 1,000 times" stricter than those set by the World health organization, (WHO). Moreover, the association said the low limits may be difficult to pinpoint. IPS board member Heinz Schulz, head of the Schering agrochemicals division, said he is convinced that German health authorities will grant exceptions in specific cases, as foreseen by the EEC directive. "When WHO limits are not exceeded, there is no danger to health," Schulz said.

The German crop protectants industry favours limits that take account of the specific toxicological properties of the active ingredients, as in food and drug law. In the industry association's view, the EEC regulation "discriminates against an entire product sector."

Schulz said a working group of European agrochemical producers now charged with implementations may be able to convince lawmakers that the limits are unrealistic. In Schulz's words, "Taboos can be broken if we have the better argument".

West Germany's crop protectants manufacturers profited from an upturn in sales volumes in the first quarter of 1988 compared with the first three months of 1987, according to IPS. The industry association pointed out, however, that exact figures on turnover, production and earnings in the first quarter are not yet available.

Figures for 1987 show that industry-wide turnover fell by nearly 15 per cent to DM4.2bn ($2.5bn), which IPS attributes almost entirely to the 21.5 per cent decline in foreign sales to DM2.88bn.

West German sales rose 4.6 per cent to DM1.2bn, due largely to improved prices for some specialty products. Prices for commodities stagnated for the most part, according to IPS chairman Gerhard Prante, director of Hoechst's agrochemicals division.

Prante said the sales upturn was achieved despite a 5 per cent decline in volume sales to 29,857 ton. The lower volumes are attributed to a major extent to the expanded market share of products with higher potency. Because of wet weather in 1987, consumption of fungicides increased at the expense of herbicides and insecticides. IPS said herbicides continued to account for the largest share of production (57 per cent), followed by fungicides (31 per cent) and insecticides (4 per cent).

Production of active ingredients for crop protectants in W. Germany declined by 18.5 per

CETUS TO SEEK IL-2 APPROVAL IN U.S.

Cetus is expected to apply for US approval of interleukin-2 within the next two months. The US biotechnology concern filed for approval in Europe last month and is expected to focus on renal cell carcinoma and malignant melanoma both with and without lymphokine activated killer cells. Cetus is still searching for a Japanese licensee for IL-2.

Although Cetus hopes to have products in the marketplace within 12 months, launches in both Europe and the US are unlikely to take place for about 18 months, according to industry observers. Sales of IL-2 products in Europe and the US are, however, likely to total $200m three years after launch.

Eventually, according to Robert Kupor of Cable Howse and Ragen, the market in 1992 will be dominated by Cetus and Immunex/Hoffman-La Roche. "No other companies involved in IL-2 development in the West are close to these front runners but in Japan Takeda and particularly Ajinomoto are far enough in the lead to win market dominance," he says.

Cetus is about nine months ahead of Immunex/Roche in both Europe and the US. The so-called Tanaguchi patent issued to Immunex/Roche in the US recently is likely to result in a patent pooling agreement. The Taganuchi patent contains a claim that appears to cover, although not specifically, the Cetus product.

It is possible that Cetus could get round the slightly narrow version of the patent in Europe, permitting it to make IL-2 in the Netherlands and export to the US. More likely is a patent poo-

IL-2 without having to pay royalties to Roche.

DUTCH PASS WASTE EXPORT LAW, EEC RAISES PRESSURE

The Dutch cabinet has approved new legislation to control the across frontier transport of chemical waste. The new law will give the environment ministry the necessary teeth to compel Dutch firms to comply with EEC guidelines. The Dutch government wanted to phase in imposition of the guide lines over a longish period but the European commission insisted on immediate application.

The main features of the Dutch law include a ban on shipments of chemical waste to or from the Netherlands unless it carries the stamp of environment ministry approval and is conducted by approved transport companies. Currently around half of the country's 1m ton/year waste is sent abroad for processing with half of this incinerated and a quarter dumped in West and East Germany, Belgium and France.

Dutch environment minister Ed Nijpels has warned that sharper environment legislation does not mean an increase in the Dfl.200m/year ($105m/year) subsidies for clean up costs nor extra funds to expand the team of environment detectives. Nijpels is calling on the 4,000 official Dutch disposal sites to increase their charges but environmentalists fear this will encourage even more illegal dumping.

Officials at the European Commission are now planning to put pressure on Europe's environment ministers to implement the EEC directive concerning the export of hazardous materials from the EEC. Although the directive should have been implemented by January 1987 only Belgium and Denmark and now the Netherlands have done so in full while Greece has incorporated most into national law.

The commission now intends to speed up the implementation process in the tardier member states and intends to raise the issue at the next meeting of the EEC environment council. The directive has two fundamental conditions. First, the exporting nation must have agreement from the importing country and second, the exporting firm must provide details showing that the importing country has the facilities to handle it.

Members of the European parliament are, however, calling for even tougher measures on hazardous waste exports. At the end of last month the parliament called for a ban on all exports of toxic waste to areas in receipt of EEC development funds. Belgian MEP Francois Roelants du Vivier revealed cases of waste being exported to Guinea Bissau and Benin in West Africa.

Roelants du Vivier claims that European and US firms have concluded deals with the Guinea Bissau authorities for the dumping of 3m ton/year of toxic waste for the next five to ten years. Guinea Bissau has been offered $120m to take this waste, a figure that exceeds the country's annual GDP.

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The Belgian MEP also highlighted the deal signed between a Gibraltar-based firm and Benin. The deal involves, he claims, "a ten year contract involving rather vague quantities of waste from 1 to 5m ton/year to be exported to Benin in return for a fee payment of $2.5/ton".

Stanley Clinton Davis, the commissioner with responsibility for environmental affairs, echoes the concern of the parliament and has pledged that the cases will be investigated.

BIOTECHNICA SIGNS DEAL WITH WACKER

Biotechnica International has entered into a multi year collaboration deal with West Germany's WackerChemie in development programmes for fine chemicals and speciality enzymes. Through its wholly owned subsidiary, the Consortium fur Elektrochemische Industrie, Wacker will fund the BioTechnica programme developing gene-spliced microbial production systems for the manufacture of selected products.

Wacker intends to undertake scale up, manufacturing and marketing of the products at the end of the programme. The Wacker consortium has in the past four years more than doubled its biotechnological activities covering oligosaccharides, plant tissue culture and biological sensory systems.

BIO-DAR LINKS UP WITH SCHEIN

Bio-Dar, the Israeli biotechnology company, and US generics maker Schein Pharmaceutical have formed a technology-based R&D joint venture called Micro-Dar. The new firm will develop and license new products based on microencapsulation techniques devised by the Israeli firm. Applications include the development of time release drug delivery systems.

Micro-Dar plans to offer the technology and R&D services to the healthcare/pharmaceutical industry as well as marketing selected products through the Schein organization.

CELLTECH EXTENDS CANCER PACT

Celltech, the UK biotechnology firm, and the Lederle division of American Cyanamid have extended their research collaboration to develop new generation anti-cancer agents. The two firms originally signed a two year research deal at the end of April 1986. The deal at that time was worth £5m, and the new agreement according to chief executive Gerard Fairtlough, will be higher but of the same order.

Lederle will now provide funds for development of the novel anti-cancer agents. "Both firms are pleased with the results so far," Fairtlough said. The firms are now expected to put products into clinical trials in the very near future.

Although details of the research and development phase of the deal have not been revealed, Celltech researchers have published two significant advances. A Celltech team in collaboration with researchers at the US national cancer institute has produced a mixed human:mouse antibody that is specific for colorectal, breast and ovarian cancers The antibody has already been used for cancer diagnostics.

Ensuring that cancer radionuclides remain attached to antibodies is a problem that Celltech may have overcome. Researchers at the UK firm in collaboration with Durham university and the MRC radiobiology unit at Harwell are using a linker molecule carrying a vinyl pyridine group. This is attached to a cyclam molecule which readily takes up and binds to metal ions. By producing thiol groups on the antibody the vinyl pyridine and hence the radionuclide group is tightly bound. The antibody complex does not lose its specificity for the cancer.

EEC BACKS DUTCH AID

Officials at the European commission have approved revised plans by the Dutch government to give aid to Duphar-CPD for research into new crop protection agents. The Dutch government will be giving the Dutch-based subsidiary of Belgium's Solvay about Dfl. 8m ($4.1m) or 25 per cent of the budget for two four-year projects.

Last year the Dutch government planned to give the firm subsidies amounting to about 45 per cent of the research bill but the commission ruled that this was too high to maintain healthy competition.

GROWTH HORMONE TO BE MARKETED

Bio-Technology General, the New York-based biotechnology firm, has received approval from the Israeli ministry of health to market its recombinant human growth hormone, BioTropin. The approval is the company's first. Trials of the hormone showed that it does not produce immune responses in children, the company said.

News About New Projects

MOROCCO INVITES FIRMS TO EXPAND PHOSPHATES

Morocco, the world's largest exporter of phosphate ore, intends significantly to boost exports of the raw material. A $1.7bn expansion plan at the Jorf Lasfar fertilizer complex as well as development of new phosphate mines to support the programme, will ensure that much of the increase in exports is achieved through higher value added products.

Office Cherifien des Phosphates (OCP) has invited contractors to pre-quality for a massive expansion of the Jorf Lasfar fertilizer complex, which will in effect double production at the site by 1991/1992.

Code-named Maroc Phosphore 5 and 6, the project calls for the construction of units to produce 4.55m ton/year of sulphuric acid and 1.32m ton/year of 54 per cent P_2O_5 phosphoric acid. Downstream facilities should be designed to produce a total of 1.74m ton/year of solid fertilizers, including triple superphosphate, monoammonium phosphate, diammonium phosphate and NPKs. In addition a 110 MW power station is included in the investment plan.

The Sibi Chennane mine at Khouribga and Benguerir 2 mine will be developed to supply phosphate raw material to the new facilities.

The specification also calls for the delivery of six 12-24,000 ton chemical tankers to transport phosphoric acid.

Numerous companies have responded to the prequalification call. These include firms in Brazil, the UK, Denmark, France, Korea, Canada, Belgium and Yugoslavia.

Located some 100 km southwest of Casablanca, Jorf Lasfar is claimed to be the world's largest fertilizer complex. It currently processes 4m ton/year of phosphate ore and produces 1.7m ton/year of fertilizers.

The output comes from Maroc Phosphore 3 and 4 (1 and 2 are at Safi), built by the French contractor Technip under a contract awarded in 1984. Under this deal Technip supplied units for 1m ton/year of DAP, 400,000 ton/year of TSP and 200,000 ton/year of ammonium sulphate phosphate, using Gesa technology.

The existing Jorf Lasfar complex also includes eight 165,000 ton/year phosphoric acid units based on Rhone-Poulenc technology and six 2,300 ton/day Monsanto-process sulphuric acid plants.

Last year OCP produced 22.1m ton of phosphate ore of which 12.2m ton was exported. OCP's long-term goal is to reach production of 60m ton/year of phosphate ore by the end of the century.

SHELL PICKS LIPPSHAC FOR UK UNIT

Shell has chosen its own liquid pool Shell high activity catalyst (Lippshac) process for a new world-scale polypropylene plant at Carrington in the UK. The company is the world's second largest PP producer. Finance for the plant has not yet been committed.

Capacity of the planned unit has not been revealed but is thought to be in the 120-140,000 ton/year range. It will add to Shell's existing PP unit at Carrington which has recently been expanded from 110,000 ton/year to 135,000 ton/year.

The Lippshac PP process, which produces homo and random copolymers is already used in Europe in Shell's Pernis plant in the Netherlands. The company has also licensed the technology for new plants it plans to build as joint ventures in Argentina and Brazil.

Increased demand for homopolymer product is thought to be behind Shell's latest decision. Flat yarn and spun fibre, based almost exclusively on homopolymer product, represent around 35 per cent of total PP demand in Western Europe. Film, also almost all homopolymer-based, represents another 14 per cent of demand, whilst injection moulding applications, put at around 47 per cent of demand, is split evenly between nomo and copolymer.

Following its decision to use the Union Carbide Corp's Unipol PP process in its grass roots 120,000 ton/year plant at Wesseling, West Germany Shell will be well placed to supply customers with block copolymers from that facility.

According to Jim Gordon, head of Shell's international chemical operations, polypropylene could be in surplus to the tune of 10-25 per cent by the mid-1990s.

BBA AROMA HIKE

Union Camp has announced the expansion of facilities in its Bush Boake Allen's (BBA) division for producing synthetic geraniol from turpentine. The expansion will take place at BBA's existing production sites in Jack-

sonville, Florida, and Widnes, UK.

Bush Boake Allen is a producer and marketer of flavours, fragrances and aroma chemicals. The aroma chemical product line covers a broad spectrum of petrochemical-based products in addition to those based on turpentine. The expansion is prompted by the continued strong demand.

US CONSORTIA LEAD HUGE SOVIET JV'S

At the end of the Reagan-Gorbachev superpower summit in Moscow recently, it was revealed that two consortia headed by US companies are being formed to build massive petrochemical complexes in the Soviet Union.

Exclusively revealed in ECN May 23, the first will be set up at Nizhnevartovsk, 700 km northwest of Tomsk, the original name under which the project was known.

Dr. Armand Hammer, chairman of Occidental Petroleum, has signed an agreement with the Soviet ministry of the chemical industry for the Western Siberian project, which will use hydrocarbons from the Tyumen region.

Some observers are stunned as to the scale of Occidental's ambitions towards the Soviet chemical sector.

The company is already involved with Montedison, Enichem and Marubeni in a huge polymer venture at Tenghiz, near the Caspian Sea.

Hammer has now agreed to head a consortium of companies to develop a new complex which will produce 300,000 ton/year of ethylene, 300,000 ton/year of styrene, 240,000 ton/year of formalin, 200,000 ton/year of polyethylene, 100,000 ton/year polystyrene 40,000 ton/year of polyformaldehyde, 10,000 ton/year polyphenylene oxide, 20,000 ton/year of polybutylene terephthalate, 30,000 ton/year of other plastics and 100,000 ton/year of composites.

Meanwhile Combustion Engineering and McDermott International have signed agreements in principle with the Soviet ministry of oil refining and petrochemicals to head another consortium to study and develop the proposed giant Surgut and Tobolsk complexes.

The projects could be worth more than $20bn, according to Charles Hugel, Combustion Engineering president. The companies have had preliminary talks with Mitsui and Mitsubishi Corp, which could join the new group.

VEBA/PEQUIVEN PROPYLENE PLAN, ETHYLENE BIDS OUT

Venezuela's state-owned petrochemical company Pequiven and Veba Oel of West Germany have signed a letter of intent to study the feasibility of a $100-120m propylene-producing joint venture in Venezuela. In addition contractors have been invited to bid for a major olefins complex planned by Pequiven.

To be located at Jose, near Puerto La Cruz, the site of a natural gas liquids separation facility, the first project would produce 200-250,000 ton/year of propylene using propane dehydrogenation technology.

The bulk of the propylene would be destined for export but around 50,000 ton/year would be earmarked for local consumption in isopropanol and/or oxo alcohols.

In addition, some propylene would be used to feed a medium-scale polypropylene unit, which would also supply product for export. This unit would also be at Jose, where Venezuela plans to concentrate most of its future petrochemical facilities. The reason, explains a top executive is "because the gas is there".

The two optional processes available for propane dehydrogenation are those of UOP and Houdry. UOP is currently installing a facility in Thailand.

The Venezuelan study is expected to take around six months. If feasible, the project would proceed sometime next year for completion 30-36 months later.

Sources say the shareholding has not been fixed yet but usually the principal partners end up each having around 49 per cent of the equity, with other local investors holding the rest.

Markets for the product have not been precisely identified but Veba would probably take some of the propylene. Should the project proceed, it will be the third chemical facility built at Jose.

Santa Fe Braun has completed basic engineering and some detailed design for a 1,500 ton/day ammonia plant which will be built in a joint venture between Pequiven and Norsk Hydro. The Norwegian company is currently

trying to firm up loans for its share of the $200m investment. Final agreement is due to be signed in October or November of this year.

Construction on a 500,000 ton/year methyl tertiary butyl ether (MTBE) plant is now well under way at Jose. The unit, a joint venture between Italy's Ecofuel and Pequiven, is being built by Snamprogetti for completion in 1990.

In the mid-1990s Pequiven may be in line to build a new ethane-based 350-400,000 ton/year ethylene plant at Jose in which Veba could also take a stake.

In the meartime, however, Pequiven is going ahead alone in a project to build a 350,000 ton/year ethylene and 130,000 ton/year propylene facility at El Tablazo, based on ethane and propane.

Contractors have been invited to bid following selection of four acceptable technologies. These are Linde, Luminus-Crest, Stone & Webster and KTI/Technip. The due date is September.

Work is under way on Venezuela's first polypropylene plant. The 70,000 ton/year unit is being set up by Propilven for local consumption. It will be fed with propylene already produced at El Tablazo. This monomer is now shipped out of Venezuela under a toll arrangement and converted into polypropylene.

DSM IN POWDER RESINS PLAN

DSM'S resins division and Eternal Chemical Co of Kaohsiung, Taiwan, have signed a letter of intent to set up a joint venture to produce powder polyester resins in Taiwan.

A feasibility study is under way on the project which envisages construction of a plant with a capacity of 4,000 ton/year, expandable to 9,000 ton/year. Work could begin at the end of 1988.

The joint venture fits in with the Dutch producer's strategy of further internationalization of its resins activities. The facility in Taiwan will enable DSM to serve the fast growing markets of the Far East. The company has started up a 9,000 ton/year plant in Augusta, US, and has plans to increase capacity of its Dutch and Spanish units.

The resins are the main raw materials used in powder paints. Applications include finishing and protection systems for automotive parts, white goods such as refigerators and washing machinnes, agricultural machines, facade elements, ceilings, bicycles and glasses.

LURGI WINS SASOL PP CONTRACT

Frankfurt Engineering contractor Lurgi has been appointed to coordinate work on 120,000 ton/year polypropylene plant to be built at the Secunda works of South African petrochemical major Sasol.

Lurgi's part of the R340m contract is worth between DM12-15m and includes complete detail engineering in addition to co-ordination of construction and equipment supply. BASF is to provide basic engineering and license its gas phase technology.

The polypropylene plant, set to come on stream in early 1990, will convert polypropylene produced at Sasol's coal-to-oil conversion complex. Some of the product will supply the South African as well as export markets.

STAMICARBON LLDPE LICENSING DEAL

Stamicarbon, the process engineering subsidiary of DSM, has signed its second linear low density polyethylene licensing agreement. Under the deal it will provide the DSM Compact solution process technology to Formosa Plastics Corp of Taiwan for a 140,000 ton/year plant.

The unit will produce the full range of polyethylene from linear low to high density, including medium and very low density material. The site of the new plant, due on stream end of 1990, has net yet been selected.

In 1982 Stamicarbon licensed the Compact PE process to Idemitsu Petrochemical of Japan. The 60,000 ton/year plant at Chiba has been operating since 1985.

ARCO GIVES GO AHEAD

Arco Chemical's board of directors has authorized the construction of a previously announced propylene oxide/styrene monomer complex, which includes propylene glycol and urethane polyol facilities to be built in Ulsan, South Korea.

Scheduled on stream in 1990, the plant will have capacities to produce 100,000 ton/year propylene oxide and 225,000 ton/year of styrene monomer. It will be owned by Yukong Arco Chemical Ltd, a 50/50 joint venture between Arco and Yukong Ltd.

News from Japan

Ethylene Production In FY 87 4.7 Mil. Tons; 2nd Highest

Japan's ethylene production during fiscal 1987 ending in March 1988 registered 4,714,000 tons, the highest record since the temporary measures law was enforced in 1983 to help to rehabilitate specific depressed industries including the petrochemical industry, the Ministry of International Trade and Industry (MITI) has reported.

The figure shows a 7.7% increase over the preceeding year and is 8.8% larger than the combined nominal capacity of 4,330,000 tons. The latest yearly production figure is also the second highest in history, following the 4,840,000 recorded in fiscal 1979.

MITI explained that the increase of the actual production over the nominal capacity resulted from increased naphtha conversion into ethylene and the practice of "hard cracking" to meet strong ethylene demand. MITI expects ethylene demand to grow this year at the rate of 4-5% against the preceding year's and Japanese producers will be able to satisfy the increased demand this year by elevating production efficiency, skipping regular repairs by adjusting operating conditions under the government's permission and also by resuming operation of mothballed plants.

The current boom is attributed to the thriving business of polyolefin and styrene products, PVC resins, rigid PVC pipes, and electrical wires and cables. Export to South Korea in FY 1987 also increased to about 140,000 tons from 60,000 tons in

Tanabe will produce E. Merck's Drugs under Technical Tie-Up.

Tanabe Seiyaku Co., an Osaka-based pharmaceutical firm, has concluded a technical tie-up contract with E. Merck, a West German drug maker.

Under the agreement, Tanabe will produce and market in Japan Merck developed drugs under a license from the West Germany firm as well as conduct application development of Merck Drugs. They intend to set up a joint venture here when sales reach a certain level.

The technical collaboration will be centered on cardiovascular agents and agents effective for the central nervous system, whose markets in Japan account for 25% of the total drug market and are expected to grow further with the ageing of the population.

Under the long-term agreement, Tanabe will obtain exclusive sales rights for Japan for new drugs of the above-mentioned two types to be developed by E. Merck.

The first drug to be produced under the pact is beta-blocker which has been licensed to Tanabe.

Japanese Chemical Operations Pick Up in Jan. — Mar. Period

Business indicators for chemical operations in the first quarter of this year reached their second highest level, reflecting an increase in domestic demand covering housing public and plant/equipment investment and personal consumption and the tight supply-demand situation for chemical products throughout the world. The tempo of business expansion, however, slowed down.

The above moves are perceived from replies to questionnaires on chemical operations, which were sent to interested parties last March by Japan Chemical Industry Association.

Business indicators for four sectors — combined chemical petrochemical, organic chemimical, finished products and inorganic chemical sectors — exceeded the preceding term's levels and those for the first sector marked record highs for the second period in a row, Those for some sector, however, denote markedly poor business operations. There is an indication that domestic chemical business is splitting into two i.e. that moving upward and that moving downward.

Hitachi Chemical to Build Biotech Lab in California

Hitachi Chemical Co. a 56% owned subsidiary of Hitachi Ltd., will construct biotechnology research laboratories on a site of the Medical Department of University of California, Irvine (UCI), the U.S. Construction is scheduled to start this December and be completed within a year.

The Japanese company and UCI have had a friendly relationship since the former channeled $ 600,000 to UCI in 1984 for biotechnology research.

A 3-story building with a floor space of 3,700 m^2 will be built on a site of 11,000 m^2 with funds of Y 2 billion. The laboratories are designed to carry out research related to biomedicine, bioreactors and electronics. The 2nd and 3rd floors will be allotted to Hitachi Chemical and the 1st floor will be rented to UCI.

—The labs will be operated by Hitachi Chemical Research Center, Hitachi Chemical's wholly owned subsidiary based in California.

Toyo Jozo Sets up Swiss Subsidiary to Promote R & D In Europe

Toyo Jozo Co. has established a wholly owned subsidiary — Toyo Jozo AG — in Zurich, Switzerland. The new company is scheduled to promote pharmaceuticals development, provide the Japanese company's licensees living in Europe with scientific know-how and collect data on R & D for new drugs and on clinical tests on them.

The reason for locating the new subsidiary in Switzerland is that the country is convenient for obtaining access to France, W. Germany, Italy and Britain with regard to development of new drugs and collection of related data.

The Japanese company is considering establishing another new firm in Europe independently or on a joint-venture basis, thereby inaugurating marketing activities there.

It has licensed production technology for Elcitonin — a synthetic calcitonin derivative — to two Italian companies, two Spanish ones, Hormon Chemie (W. Germany) and SmithKline Beckman (U.S.). In Italy in particular, the product is employed mainly as a drug effective against osteoporosis and its sales amount to Y 10 billion : the corresponding figure for Japan is Y 18 billion.

The company has also licensed Ricamycin technology to Italian, French and Spanish firms and subjected the macrolide antibiotic to phase-III clinical tests. A W. German company has put Toyo Jozo's "Bredinin" immunosuppressant into clinical tests.

It will transfer development work for "Bredinin" to the new subsidiary. They hope to develop the drug to the point where it can rival Sandoz "Ciclosporin A" in sales : the latter is the world's best-selling immunosuppressant.

New Developments from Japan

Mochida, French Firm Link For Antithrombosis Drug

Mochida Pharmaceutical Co. has concluded a joint development contract with Rhone Poulenc Sante (France) for the application of eicosapentaenonic acid (EPA) to a drug preparation for treatment of thrombosis and atherosclerosis, etc. Both companies will use a substance containing 90% ethyl icopenate (EPA-E) — an ethyl ester of EPA — developed by Mochida and Nippon Suisan Kaisha, the world's largest fishery company.

It is the first time that EPA has been modified into a substance to be applied to an ethical drug. The substance (development code : MND21) will be formulated into an anti-atherosclerosis drug etc., by the two companies. MND21 is said to present little problem with regard to side effects.

EPA is known to inhibit flocculation of blood platelets as well as help reduce lipids.

Rhone Poulenc Sante is the drug "department" of the Rhone Poulenc group and has yearly sales of 14 billion francs and 3,000 researchers working in laboratories in the West.

Large Plant for Petroleum Pitch-based continuous Carbon Fiber Planned

Nippon Oil Co. plans to build a 50-t/y plant for petroleum pitch-based continuous carbon fiber at its Yokohama refinery at a total cost of Y 2,200 million. Completion of the new plant — the largest of its kind in Japan — is scheduled for the spring of 1989.

The company has developed technology for producing high-purity petroleum pitch and carbon fiber having both high elasticity and strength. It has succeeded in reducing "fuzzing-out" of the fiber concerned.

The modulus in tension and tensile strength of the targeted fiber stand at 40-80/mm^2 and 330 kg/mm^2, respectively. The corresponding figures for available regular-grade products are 23-24/mm^2 and 280 kg/mm^2, respectively.

The said carbon fiber has such high modulus in tension that when used the amount required is small, reducing production costs and the weight of the applied products.

The company — together with Nippon Petrochemicals Co., — aims to exploit application of the new product in sporting goods, parts for industrial-use machinery and aircraft and structural material for space stations.

In Japan, petroleum pitch-based continuous carbon fiber of high-modulus type is being developed mainly by oil companies including Kashima Oil and Toa Nenryo Kogyo. Production capacity for their plants is at most 10 tons a year.

Nippon Paint to Produce Photosensitive Plastic

Nippon Paint Co. has decided to commercialize electrocoating-process photo resist (photo-

sensitive plastic), which has been attracting the attention of those concerned as a next-generation printed-circuit photo resist.

The company will arrange a mass-production structure within this year and start production and sales of the product.

Nippon Paint's electrocoating process photo resist can form at high yield rate precise circuit patterns on printed circuit boards having over 20 pin holes (holes in which terminals of semiconductors are to be put: 2.54 mm intervals).

Several printed-circuit-board manufacturers have adopted the electrocoating-process photo resist involved and the company considers that the product has become economically viable.

Consequently, taking advantage of the opportunity offered by establishing the mass-production structure, the company will expand sales of the item as a major product in its business strategy.

Much Denser, More Corrosion-Resistant TiN Film Made

Matsushita Electric Works, Ltd. has established technology for producing much denser, more corrosion-resistant titanium nitride film by means of an ion beam and an electron gun.

The new method called "ion-beam assisted vapour-deposition process" vapour-deposits titanium nitride on a base by vaporizing titanium by means of an electron gun while radiating nitrogen by means of a reactive ion gun, after bombarding the surface of the base by means of an ion gun. The thereby-produced film as 10 times denser and has 7 times greater corrosion resistance than those produced by conventional methods the company claims.

This process enables the formation of a uniform film with a diameter of up to 400 mm and assures continuous operation for 200 hours. In addition, by arranging the flow of titanium ions and the direction of the nitrogen radiation, it can also control the crystalline structure of the compound.

The company has already commercially applied this process to the manufacture of high-class shaver blades for men. It plans to apply this process to the deposition of aluminium nitride and boron nitride as well as manufacturing of molds and jigs of chromium nitride, etc. and diamond carbon films. The process can also be applied to manufacture of new composite materials composed of metals and ceramics, and high polymers and ceramics or metals.

Commenting on this process, Dr. M. Iwaki of Institute of Physical and Chemical Research says: "Matsushita's process is unique in that it has conquered a problem with regard to production cost which has been the bottleneck in commercially applying the ion-beam assisted vapor-deposition process". The success is a great encouragement to the researchers involved and will stimulate commercial application of ion beams from now on.

Glutathione Mass-Produced Using Recombinant DNA Tech.

Kikkoman Corp. has succeeded in mass-producing glutathione using two types of genetic-engineering technology. Escherichia coli was employed as a host.

One of the two types of technology is involved in development of a phase-vector system. The company has attained a technical breakthrough in cooperation with a food research group led by Professor H. Kimura of Kyoto University. They have introduced a biosynthesis gene for glutathione into a vector and implanted the resultant product into Escherichia Coli. They have confirmed that the genetically engineered microorganism has an increased production capacity for glutathione.

The other is related to the supply of adenosine triphosphate (ATP), which acts as an energy source within the body of the said microbe. ATP is biosynthesized from ester of phosphoric acid and adenosine diphosphate with acetate kinase (ACK) used as an enzyme. The company has implanted an ACK gene — which has been obtained from Escherichia coli using a self-cloning method — into the same type of microorganism. This step is intended to produce a large quantity of the said enzyme and ATP within the body of the microbe.

Glutathione is a low-molecular compound produced through peptide bonding of three types of amino acid — glutamic acid, crystine and glycine. It is used as a drug effective for liver disease and as an antidote.

To date it has been produced by culturing yeast and extracting the targeted product therefrom. This method, however, has drawbacks in that the product (glutathione) has an odour peculiar to the yeast used and contains impurities in large quantities.

Glutathione produced using the Kikkoman process is free from such an odor. The company envisages applying the product to production of "functional" food for dietary and medical uses. It plans to determine the optimum production conditions by employing a bioreactor. Kohjin is also conducting research on mass production of glutathione.

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MARKET INFORMATION

Chemicals Steady

A steady to better condition prevailed in the Bombay Chemical Market.

The manufacturers of Polysol were bitter about the shortage of PVA, Gohsenol etc. It is reported that Vam Organic had jacked up the rate of VAM by Rs. 2 to 3. Mercury also shot up to Rs. 10,500. The other major items remained steady. Propylene was in rage owing to higher international booking.

In the dyes intermediate section, anthraquinone moved up to Rs. 90/-. Acrylamide was quoted at Rs 62/-. Many of the dye intermediates were in short supply.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent — and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on 6th July 1988)

INDUSTRIAL CHEMICALS	Per kg.
Ammonium sulphate	2.00
Ammonium phosphate (Mono)	14.50
Ammonium phosphate (Di)	12.00
Ammonium carbonate (Di)	17.00
Ammonium bicarbonate	4.75
Ammonium chloride	3.00
Ammonium nitrate	3.50
Arsenic white powder	21.00
Acrylamide (Resale)	62.00
Barium carbonate	6.00
Bleaching powder (33% Cl)	4.00
Borax (Granular)	13.50
Borax (Powder)	20.00
Boric acid (Tech.)	21.00
Bisphenol-A	57+ST
Butyl carbitol	48.00
Caustic soda (Flakes)	9.20
Caustic soda (Solid)	8.00
Caustic soda (Lye)	7.00
Calcium chloride 70% (solid)	3.25
Calcium chloride 75-80% (fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium Carbonate PPT	3.00
Calcium carbonate (Activated)	3.55
Camphor (Indian)	82.00
Cresylic acid	50.00
Cream of Tartar (Tech.)	70.00
Citric acid (Belgium) (Resale)	43.00
Citric acid (Indian) (Resale)	42.50
Copper sulphate	17.50
Chromic acid	48.00
Cyanuric chloride	120.00
Cobalt oxide	280.00
Carbitol	55+ST

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Ethylene urea		56.00
Ferric chloride (Lumps)		7.00
(Anhydrous)		16.00
Glue flakes		8.45
Glue sheets		6.75
Gohsenol GH-17		140.00
Hydro	(Resale)	41.50+ST
Hyflosupercell		19+ST
Hexamine	(Resale)	35.00
Industrial Wax		25.00
Litharge		15.00
Lead Acetate (Tech)		28.00
Lithopone		15.50+ST
Magnesium chloride (Crystal)		1.00
Menthol crystal (Flakes)		185+Ex.+ST
Menthol bold		205+Ex.+ST
Menthol crystal bold		245+Ex.+ST
Magnesium carbonate (Japan)		16.00
Magnesium carbonate (Indian)		15.00
Maleic Anhydride (per kg)		
	(Resale)	45+ST
Mercury (75 lbs.)		10500.00
Nickel chloride		90.00
Oxalic acid	(Resale)	22.00
Peppermint oil (Rectified)		90+Ex.+ST
Potassium carbonate (Indian)		19.00
Potassium carbonate (Imported)		21.00
Potassium bichromate		22.00
Potassium phosphate (Mono)		14.00
Potassium phosphate (Di)		14.00
Polyvinyl alcohol (No. 117)		100+ST
Polyvinyl alcohol (No. 173)		
	(Resale)	130.00
Polyvinyl alcohol (No. 208)		115.00
Paraformaldehyde (Resale)		20+ST
Phthalic anhydride 36%		
	(Resale)	24.00
Pentaerythritol	(Resale)	51.00
Paraffin wax	(Resale)	14.50
Rangolite (German)		80+ST
Rangolite (Czech.)		54+ST

Sodium sulphate (Fine)		6.00
Sodium sulphate (Coarse)		5.00
Sodium sulphide 50-52%		
(Flakes)		8.00
Sodium sulphide 58-60%		
(Flakes) (TCL)		21.00
Sodium sulphide pure (Flakes)		12.25
Sodium nitrite	(Resale)	800.00
Sodium chlorite 80% (Spain)		94.00
Santobrite (Indian)		36.00
Soda Ash (Tata)		4.00
Soda Ash (Birla)		3.80
Soda Ash (Imp.)		3.50
Sodium bicarbonate		5.25
Sodium bisulphite		4.50
Sodium silicate		3.00
Sodium acetate		6.00
Sodium alginate		140+ST
Titanium Dioxide (Anatase)		50+ST
Titanium Dioxide		
(Rutile — RCR_2)		69+ST
Tartaric acid (Crystal)		94.00
Trisodium phosphate		4.80
Thiourea		72+ST
Urea (Tech)		2.75
Vacuum salt		1.00
Zinc Dust		30.00
Zinc Oxide		30.00
Zinc chloride powder		
(technical)		14.00
Zinc sulphate		4.00

SOLVENTS		Per kg.
Acetic Acid (Glacial)	(Resale)	14.50
Acetic Anhydride	(Resale)	24.00
Acetone	(Resale)	15.00
Adipic Acid		52+ST
Aceto Acetanilide		50.00
Aniline Oil	(Resale)	50.00
Benzoate Plasticisar		45.00
Butyl acrylate		90+ST
Butyl stearate		36.00
Butanol	(Resale)	34.00
Benzyl Alcohol		60.00
Benzyl chloride		34.00
Benzo trichloride		16.00
Benzoyl chloride		22.00
Bromine Liquid		42.50
Chloroform		25.00
Carbon Tetrachloride		15.50
Cellosolve		45+ST
Cyclohexanone		53+ST
Cyclohexanol		43+ST
Diacetone	(Resale)	35.00
Diethyl Oxalate		34.00
Diethylene glycol (DEG)		40+ST
Dioctyl Phthalate		52.00
Diallyl Phthalate		66.00
Dimethyl Phthalate		28.00
Dioctyl Adipate		52.00
Dibutyl Adipate		42.00
Dipentene		15.00
Dimethylamine 40%		12.00
Dimethylamine 60%		14.00
Ethyl Acetate		22.00
Ethyl Acrylate		49.00
Ethylene Dichloride		11.00
Ethylene Glycol		36+ST
Formic Acid (Imp)	(Resale)	29.00
Formaldehyde	(Resale)	6.00
Glycerine (CP)		53.00
Glycerine (IW)		48.00
Hydrogen peroxide 50%		
	(Resale)	29.00
Isopropyl Alcohol		17.50
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	(Resale)	30.00
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When it comes to chemicals, we care a little extra. Making sure to produce chemicals that meet exacting standards of quality, purity and reliability. Backed by research and thorough testing. Our customer service can help you improve your present products and develop new ones. And remember, we can meet your requirement in bulk... whenever and wherever you want, why not try ?

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We market: Acetic Acid • Acetic Anhydride • Butyl & Amyl Alcohol • Ethyl & Butyl Acetate Acetaldehyde • Paraldehyde • D.B.P. • D.E.P.

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Packed in 25 Kgs and 50 Kgs HDPE Bags and 50 Kgs M.S. & G. I. Drums

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(FORMERLY GWALIOR RAYON)

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OFFICE :
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Tel. Nos. : 272405/270393

(Inquiries for Acetone Cyanohydrine (GUJACH) and Methyl Methacrylate Monomer (GUJMER) for chemical application also solicited.)

Bombay dyes market

(Prices as on 6th July 1988)

ACID COLOUR	Per Kg.
Acid Violet 4BS	143.00
Acid Maroon V	110.00
Acid Orange II	77.80
Acid Orange IIY	63.05
Acid Red A	107.25
Crosein Scarlet MOO	155.00
Acid Scarlet 3R	99.90
Acid Red 38N	135.00
Acid Red R2R	132.00
Acid Red RS	88 00
Acid Green V	230.00
Acid Patent Blue AS	250.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	121.95
Acid Black BX	98.40
Acid Black Wax	135.50
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

DIRECT COLOURS	Per Kg.
Yellow 3GX	88.10
Gun Yellow RCH	124.00
Fast Yellow GCH	141.15
Yellow CFG Hly. Conc.	312.00
Fast Yellow GS	111.65
Fast Yellow CHRS	95.45
Viscose Orange A	166.15
Fast Orange GR	133.75
Red	96.90
Dark Tan	78.25
Red IIR	72.55
Red 4B	169.10
Bordeaux BW	132.30
Fast Scarlet 4BS	166.55
Red 12B	170.55
Bordeaux Hly. Conc.	194.00
Cotton Red N	117.05
Brill. Fast Helio B	278.00
Brill. Fast Helio 2B	297.00
Brill Fast Helio 2RS	136.20
Brill. Fast Helio BS	116.10
Brill. Violet Extra	126.40
Blue 2B	86.60
Blue G	170.50
Sky Bue FB	188.25
Copper Blue GR	147.00
Fast Greenish Blue GL	114.60
Developed Black BT	116.10
Blue NB-2B	300.20
Blue NB-2BC	185.30
Developed Black NB-GHB	185.30
Green B	111.65
Green NB-B	188.25
Green 2B-N	188.25
Brown MR	154.40
Brown CN	107.25
Golden Brown G	140.35
Catechin G	120.50
Omega Tan	126.40
Catechin GS	102.80
Black E Hly Conc.	142.60
Black E Extra Hly. Conc.	142.60
Black NB-ER Hly. Cone.	310.50

DISPERSOL COLOURS	Per Kg.
Yellow 6G Powder	143.80
Red B 3B Powder	247.80
Red B 2B Powder	323.20
Red CB Powder	439.15
Red D2B Powder	477.40
Violet C 4R	521.90
Blue BG Powder	235.45
Blue BN Powder	103.75
Blue D 2R Powder	476.25
Navy BT Powder	243.90
Blue B 2G Powder	210.20
Black BT Powder	182.60
Blue BR Powder	390.20
Yellow 7GL	338.60
Yellow 5RX	218.80
Yellow 3G	367.25
Yellow	140.00
Yellow AL	135.30
Yellow Brown REL	247.50
Yellow FFL	463.60
Gold Yellow GG	259.70
Pink REL	247.00
Red REL	468.65
Red 2B	327.40
Red FB	324.20
Red Violet FBL	469.85
Orange 3R	196.65
Violet 3R	280.00
Violet RL	275.45
Violet 6R	485.75
Scarlet RR	214.80
Rubine 3B	223.00
Rubine CB	364.90
Blue GL	318.90
Blue BGF	636.50
Navy Blue RF	270.40
Brown 3REL	200.40
Black GEL	324.20
Dark Brown 3B	317.40

BASE COLOURS	Per Kg.
Fast Yellow GC	80.20
Fast Orange GC	135.45
Fast Scarlet R	166.90
Fast Scarlet RC	126.65
Fast Scarlet RCR	99.05
Fast Scarlet G	121.65
Fast Scarlet GN	91.50
Fast Scarlet GG	72.70
Fast Scarlet GGS	72.75
Fast Red B	203 20
Fast Red RC	119.15
Fast Red R Flakes	149.25
Fast Red TR	166.80
Fast Red TR Oil	183.15
Fast Red RL	237.10
Fast Red KB Oil	201.90
Fast Bordeaux GP	201.95
Fast Garnet GBC	94.00
Fast Violet B	505.60
Fast Blue BB	521.40

NAPHTHOL COLOURS	Per Kg.
ASG	217.00
AS	143.00
ASSW	279.75
ABBS	189.15
ASBO	195.65
ASD	175.50
ASOL	179.35
ASTR	279.75
ASPH	279.75
ASE	196.05
ASEI	184.40
ASLB	1632.60
ASBT	1817.00
ASWG	143.00
ASSG	397.70
ASSR	480.50

PROCION COLOURS	Per Kg.
Golden Yellow HR	181.80
Brill. Yellow H4G	117.85
Supra Yellow H-8GP	168.55
Brill Yellow HE6G	166.95
Yellow H-E4R	276.05
Brill. Yellow H7G	332.30
Yellow M4R	243.95
Yellow M GR	326.05
Brill. Yellow M4G	177.10
Brill. Yellow M8G	332.30
Yellow M 3R	217.60
Brill. Orange H 2R	241.85
Brill. Red H 7B	157.95
Brill. Orange M 2R	313.15
Brill. Red H 8B	169.45
Brill. Scarlet H RN	245.05
Supra Red H-3BP	179.30
Brill. Red H-F3B	243.45
Brill. Magenta HB	167.00
Brill. Red M 5B	98.90
Brill. Red M 8B	173.70
Brill. Pink MB	137.10
Brill. Magenta MB	121.55
Brill. Purple H-3R	180.20
Brill. Purple H-7R	175.40
Navy Blue H 3R	298.50
Brill. Blue H-GR	366.55
Brill. Blue H 5G	173.10
Blue H 5R	283.85
Brill. Blue H 7G	178.70
Brill. Blue H 7RX	358.15
Turquoise HA	234.45
Supra Blue H-3RP	335.70
Supra Turquoise H 2GP	181.50
Blue H-ERD	305.80
Navy Blue H ER	258.60
Blue H 5RX	269.30
Navy Blue M 3R	310.95
Brill. Blue MR	331.70
Brill. Blue M RX	214.20
Brill. Blue M-G	382.30
Blue M 4GD	344.60
Navy Blue M RB	318.75
Turquoise M-G	197.85
Brill. Blue M GX	302.50
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide (per kg.)	285.00
Green H 4BD	269.80
Green H-E4BI	169.80
Red Brown H IF	143.25
Orange Brown H 28	209.05
Brown M GRN	188.80
Black H-N	283.35

SULFUR COLOURS	Per Kg.
Navy Blue	99.85
Green G	198.55
Black Grains Extra	63.05
Black Grains OG	64.55
Black GXE Conc.	61.60
Black GXE	52.75
Black GXR	61.60
Black Grains 800	54.20
Black EXR Grains	64.55
Black EXR Grains 800	51.25

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Powder Fine	673.15
Yellow 5G Supra Disperse	439.30
Yellow 5G Acra Con.	628.75
Yellow 3R Powder	588.85
Gold Orange 3G Pdr. Fine	952.15
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp.	601.30
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	997.80
Brill. Red 3B Supra Disp.	713.20
Brill. Purple 4R Conc. Pdr.	470.75
Brill. Purple 3R Acra Powder	690.85
Brill. Purple 2R Hly Conc.	597.90
Brill. Purple 4R Supra Disp.	500.05
Brill. Purple 2R Acra Conc.	625.95
Blue R Powder Fine	542.15
Blue BC Conc. Pdr. Fine	522.50
Blue BC Acra Conc. Pdr. Fine	762.70
Blue R Conc. Pdr. Fine	577.65
Blue RR Supra Powder	629.35
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	389.25
Blue BC Supra Disp.	359.40
Jade Green XBN Powder Fine	438.20
Jade Green XBN Acra Conc. Powder	823.90
Jade Green 2G Pdr. Fine	419.65
Jade Green 2G Ptg. Faste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	496.00
Olive Green B Pdr. Fine	399.90
Olive D Pdr. Fine	444.30
Olive Green B Supra Disp.	308.26
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Pdr. Fine	698.55
Olive OMW Supra Disp.	538.05
Olive R. Pdr. Fine	422.98
Olive D Supra Disp.	361.70
Olive R Supra Disp.	363.90
Olive D. Ptg. Paste	193.00
Olive Green B. Ptg. Paste	199.10
Olive Green B Acra Conc.	542.75
Olive R Acra Conc.	640.00
Olive Green B Acra Conc.	542.75
Brown R Pdr. Fine	835.00
Brown G. Pdr. Fine	795.00
Brown R Pdr. Fine	659.75
Dark Brown 3R Pdr Fine	685.00
Brown G. Supra Disp.	449.90
Brown 2G Supra Disp.	554.00
Brown R Supra Disp.	422.95
Brown BR Powder	719.00
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp.	414.55
Brown G Acra Conc.	739.95
Brown R Acra Conc.	766.00
Grey M. Powder Fine	768.80
Grey M. Supra Disp.	585.45
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp.	330.35
Direct Black AC Pdr. Fine	474.70
Direct Black CH Supra Disp	393.20
Direct ACD Ptg. Paste	217.15

Madras Market

Markets have been quite dull during the week. There has been lack of good enquiries. The Tamil Nadu NGO strike has been affecting collection of bills for supplies made to Government bodies. There has been good demand for Diethylene Glycol and mono ethylene Glycol. Caustic prices have been stable. Dyeing activity has been brisk in the various District Centres and demand for Hydros is good. Hydros prices has been ruling around Rs. 45/- on account of restricted supplies.

(MADRAS MARKET RATES AS ON JULY 9, 1988)

Acetic Acid — Glacial (per kg)	18.00
Acid Slurry (Soft) (per kg)	26.00
Aluminium Sulphate Iron free (per tonne)	1,900.00
Ammonium Bi-carbonate (per 25 kg.)	125.00
Ammonium Chloride SPIC (per tonne)	2,200.00
Bleaching Powder — Mettur (per 25 kg bags)	115.00
Borax Granular	650.00
Cresylic Acid 98/99% (per kg)	85+E.D.
Meta Cresol 40/42% (per kg)	47.00+E.D
Para Cresol 80/85% (per ton)	60+E.D
Caustic Soda Flakes (Mettur) (per ton)	8,600.00
Caustic Soda Flakes (Andhra Sugar)	8,600.00
Citric Acid — Indian (per kg)	48.00
Copper Sulphate (per 50 kg)	1000.00
Formic Acid (India) (per kg)	28.00
Formaldehyde (per kg)	8.00
Glycerine (per kg)	42.00
Hydrosulphite of Soda TCPL (per kg)	42.00
Hydrosulphite of Soda IDI (per kg)	45.00
Hydrosulphite of Soda BASF (per kg)	45.00
Hydrogen Peroxide (India) (per kg)	30.00
Hyflo Supercell	19.50
Magnesium Carbonate Light	18.00
Potassium Bichromate (per kg)	28.00
Phosphoric Acid (per kg)	18.75
Phthalic Anhydride (per kg)	25.00
Pentaerythritol (per kg)	52.00
Paraffin Wax (per kg)	13.50
Oxalic Acid (per kg.)	20.00
Soda Ash (TAC) (per 75 kg)	315.00
Soda Ash (TATA) (per 75 kg)	315.00
Sodium Cyanide Indian (per kg)	55.00
Sodium Cyanide Degussa (per kg)	80.00
Sodium Bichromate (per kg)	20.00
Sodium Bicarbonate (per 50 kg)	280.00
Sodium Nitrite (per 50 kg)	750.00
Sodium Nitrate (per 50 kg)	450.00
Sodium Silicate (per tonne)	4500.00
Sodium Sulphate (per tonne)	3500.00
Sodium Sulphide Flakes (per tonne)	13,000.00
Sodium Bi-sulphite (Aswin) (per MT)	3,800.00
Stearic Acid (per kg)	32.00
Trisodium phosphate (per 50 kg)	385.00
Titanium Di-oxide Indian TTP (per kg)	48.00
Titanium Di-oxide Indian Rutile (per kg)	58.00
Urea Tech (per tonne)	2,800.00
Zinc Oxide (per kg.)	34.00
Zinc Chloride Powder (per kg.)	13.00
Zinc Sulphate (per tonne)	4,500.00
Di-octyl phthalate (per kg)	45.00
Di-butyl phthalate (per kg)	45.00
Hexamine (per kg)	35.00

SOLVENTS

Acetone (I.O.C.) (per kg)	18.00
Isopropyl Alcohol NOCIL (per kg.)	22.00
Diacetone Alcohol NOCIL (per kg)	29.00
Benzene SAIL (per kg)	16.00
Diethylene Glycol NOCIL (per kg)	48.00
Butanol NOCIL (per kg)	34.00
Toluene SAIL (per litre)	13.00
Xylene IPCL (per litre)	15.00
Phenol HOC (per kg)	29.00
Turpentine (per litre)	16.50
Sorbitol (per kg)	35.00
Trichloroethylene MCIC (per kg)	23.50
Carbon Tetra Chloride (per kg)	16.00
Chloroform (per kg)	26.00
Methylene chloride (per kg)	24.00
Methyl Ethyl Ketone (per kg)	48.00
Cellosolve (per kg)	52.00
Triethanolamine (per kg)	23.50
Ethyl Acetate (per kg.)	22.00
Butyl Acetate (per kg)	38.00
Methanol (per litre)	10.00

Delhi Market

DELHI : JULY : 8, (NNS) — Mercury advanced sharply by Rs. 250 at Rs. 10,500 per flask in the Delhi chemicals market during the week under-review, due to acute shortage of stocks along with higher advices from Bombay, says NNS. Arrivals and stock position was also tight.

In the absence of arrivals from Assam along with good demand shown by consumers, paraffin wax jumped up by Rs. 35 at Rs. 625 (per 50 kg.). Refined wax rose from Rs. 690 to Rs 725 on negligible stock position. Titanium dioxide Anatase appreciated by 50 paise at Rs. 50 per kg. in the face of restricted inflow from Kerala.

Menthol bold looked up further by Rs. 5 at Rs. 220 owing to fall in arrivals from Sambhalpur, Muradabad, Rampur and Chanduosi mandis of U.P. because of heavy rains. Menthol flake and medium jumped up by Rs. 7 each at Rs. 205 and Rs. 215 per kg. on stockists demand. Mentha oil and DMO remained steady at Rs. 158 and Rs. 85 per kg. Undertone was better in menthol items due to increased mutual speculation among speculators.

Gohsenol (G.H-17) went up sharply from Rs 80 to Rs 135 per kg. on neligible stock position and heavy demand shown by paint manufacturers.

Sodium hydro sulphite Tamilnadu drifted lower by Rs 2 at Rs 41 per kg. due to lack of seasonal consumption and commencement of about 10 tonnes of goods in the market. Sodium hydro kalali traded higher at Rs 42 against Rs. 41. Chatkolite, sufolight and rangolite prices remained unchanged at their last week level.

Tartaric acid slumped by Rs 50 at Rs. 6275 (per 50 kg) on slack offtake because of rainy weather. In the first week of May, the commodity was quoted at Rs. 6850. In the absence of enquiries, sodium nitrite declined by Rs. 25 at Rs. 725/750 (per 50 kg.)

Hydrogen peroxide lost Rs. one at Rs. 29/31 per kg. on improved supply. Other chemicals prices generally fluctuated in a narrow range on scattered buying and selling.

Turnover was poor in dyes and colours in thin trading.

(DELHI MARKET RATES AS ON JULY 8, 1988)

Ammonia Bicarb (per 25 kg)	120.00
Mercury (per flask)	10,500.00
Soda ash (per bag)	270-300.00
Ammonium chloride (per 50 kg)	125-180.00
Caustic soda solid	No Stock
Caustic soda flakes (per 50 kg)	403-404.00
Citric acid (per 50 kg)	2050-2400.00
Stable Bleaching Powder Shriram (per 25 kg)	95.00
Stable Bleaching Powder KCI (per 25 kg)	85.00
Stable Bleaching Powder MODI (per 25 kg.)	90.00
Sod. Bicarbonate (per 50 kg)	260-270.00
Sod. Hydro Sulphite (per kg)	39-42.00
Rangolite (per kg)	45-70.00
Boric acid Technical (per 50 kg)	1020.00
Paraffin wax (per 50 kg)	625.00
Tartaric acid (per 50 kg)	6,225.00
Borax Granular (per 50 kg)	575.00
Borax Crystal (per 50 kg)	600.00
Sodium Nitrate (per 50 kg)	450.00
Sodium Nitrite (per 50 kg)	725-750.00
Camphor Powder (per kg)	87.00
Camphor Thal (per kg)	97.00
Menthol Medium (per kg)	215.00
Menthol Flakes (per kg)	205.00
Menthol Bold (per kg)	215.00
Glycerine (per kg)	42-43.00
Sodium Silicate (per quintal)	200-250.00
Hexamine (per kg)	42.00
Acetic Acid Glacial (per kg)	13-13.50
Copper Sulphate (per quintal)	1900-2200.00
Formic acid (per kg)	26.00
Formaldehyde (per kg)	8.00
Hydrogen Peroxide (per kg)	29-31.00
Calcium Carbonate (per tonne)	2500-4000.00
Acid Slurry Soft (per kg)	24.00
Acid Slurry Hard (per kg)	32.00
Phosphoric Acid (per 50 kg)	825.00
Pot. Nitrate (per quintal)	900-1200.00
Pot. Permanganate (per 50 kg)	2300.00
Sod. Bichromate (per 50 kg)	1050-1100.00
Tri-Sod. Phosphate (per 50 kg)	325-360.00
Titanium Dioxide Anatase (per kg)	50.00
Titanium RC-822 (per kg)	63.00
Zinc Oxide (per mt)	32,000-40,000.00
Phenol Carbolic Acid (per kg)	33.00
Carbon Tetrachloride (per kg)	19.00
Chloroform (per kg)	28.00
Sodium Sulphate (per 50 kg)	160-170.00
Naphthalene Balls (per 50 kg)	1400.00

DYES & COLOURS	per kg
Naphthol AS	150.00
Naphthol ASG	235.00
Naphthol ASBS	200.00
Naphthol ASTR	302.00
Naphthol ASOL	191.00
Naphthol ASBO	208.00

DIRECT DYES	(per kg)
Black E. Conc.	92-155.00
Diazo Black B.T.	125.00
Green B.	119.00
Blue 2-B	86.00
Sky Blue FB	200.15
Basic Auramine	55-100.00
Basic Rhodamine B.500%	220-320.00
Basic Methylene Blue	92-130.00
Basic Violet	142-160.00
Basic Malachite Green	160-185.00
Acid Orange	45-52.00

Materials Exported

BOMBAY
(From 2.2.88 to 8.2.88)

ALPHA NAPHTHYL AMINE: To Rotterdam : Ranjitsinghji & Co., 10,440 kgs., Rs. 5,12,484.

ALUMINIUM CHLORIDE: To New York : Kline Chemicals Pvt. Ltd., 17,964 kgs., Rs. 2,02,500.

ALUMINIUM CHLORIDE (ANHYDROUS) : To Rotterdam: Kline Chemicals Pvt. Ltd., 16,800 kgs., Rs. 2,44,600 ; To Tilburg : Mangalam Inorganics Pvt. Ltd., 19,800 kgs., Rs. 2,03,603.

BETA NAPHTHOL : To New York : Vivid Exports, 3,000 kgs., Rs. 83,479.

CAMPHOR : To New York : Atlantic Exports, 125 kgs., Rs. 5,219.

CHLOROPHENIRAMINE MALEATE : To Hamburg : Transchem Pvt. Ltd., 1,000 kgs., Rs. 4,28,093.

CRYSTAL BORAX DECAHYDRATE : To Singapore : Borax Morarji Ltd., 49 Mts., Rs. 2,99,871.

CUPROUS CHLORIDE : To Mannheim : Shyam Chemicals P. Ltd., 12,200 kgs., Rs. 4,00,000.

DIMETHYLAMINE HYDROCHLORIDE : To Aqaba : Srinivas Chemical Industries, 11,340 kgs., Rs. 2,50,374.

DIMETHYL AMINO ETHYL CHLORIDE HYDROCHLORIDE : To Hamburg : Mentor Chemical and Pharmaceuticals Ltd., 2,500 kgs., Rs. 2,42,620.

DOXYCYCLINE HCL BP 80: To Hamburg : Ranbaxy Laboratories Ltd., 250 kgs., Rs. 4,57,796.

ETHYLENE CHLORO HYDRIN WATER SOLUTION : To Aqaba : 9,660 kgs., Rs. 1,78,080.

GAMMA ACID : To New York : Priya Chemicals, 4,375 kgs., Rs. 3,82,397.

G. SALT : To New York : Vivid Exports, 3,594 kgs., Rs. 1,00,451, 3,810 kgs., Rs. 1,04,704.

GUAR GUM : To Yokohama : Associated Dichem Corporation, 18,000 kgs., Rs. 4,44,974 ; To Houston : Jai Bharat Gum & Chemicals, 72,000 kgs., Rs. 16,23,711; Rathi Trading Co., Jodhpur, 72,000 kgs., Rs. 16,23,943 ; To Charleston : Hindustan Gum & Chemicals Ltd., 18,144 kgs., Rs. 2,63,041 ; To Houston : Indian Gum Inds. Ltd., 20,000 kgs., Rs. 3,14,151 ; To Tokyo : Indian Gum Inds. Ltd., 36,000 kgs., Rs. 8,27,820 ; To Houston : Hindustan Gum & Chemicals, 1600 kgs., Rs. 2,63,041.

GUM GUAR : To Albizzate : Corporation, 20,000 kgs., Rs. 4,59,921 ; To Benganio : Indian Gum Industries, 20, kgs., Rs. 4,61,340 ; To Hamburg : Sonal Exporters, 20,000 kgs., Rs. 4,51,030 ; To Le Mavne : Indian Gum Industries, 20,000 kgs., Rs. 4,42,650 ; Bagadia International, 20,000 kgs., Rs. 6,23,711.

GUM KARAYA : To Avonmouth : Ratansey Damji & Co., 16,000 kgs., Rs. 7,00,000 ; To Felixtowe : Laxmi Enterprises, 16,794 kgs., Rs. 6,61,300 ; To Le Havre : Manilal Bros., 16,000 kgs., Rs. 4,79,502 ; R. Kantilal & Co., 16,000 kgs., Rs. 4,98,682; To New York : Asian Gums & Chemicals P. Ltd., 16,000 kgs., Rs. 3,94,974; to Tokyo : Asian Gum & Chemicals P. Ltd., 60,000 kgs., Rs. 1,64,948.

H. ACID : To Hamburg : Vishnu Chem Intermediates, 13,067 kgs., Rs. 12,74,474 ; To

AVAILABLE IN READY STOCK

SULFAMIC ACID

SULFAMIC DESCALANT GP & SR GRADE

CATALYST LCP

Mfg. by :

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Le Havre: Atul Products Limited, 13,700 kgs., Rs. 13,99,842; To New York: Bhoir Import Export P. Ltd., 2,440 kgs., Rs. 2,22,937; To Odessa: Chemical Distributors Ltd., 30,768 kgs., Rs. 27,52,576; Sajjan Impex P. Ltd., 11,450 kgs., Rs. 9,89,567; Zenith Ltd., 36,750 kgs., Rs. 29,01,171.

HIGH DENSITY POLYETHYLENE: To Busan: Beta Naphthol P. Ltd., 30,000 kgs., Rs. 7,63,208.

IRON TRICHLORIDE: To Lattakia: Raunaq International Ltd., 15 Mts., Rs. 1,24,163.

LIQUID CHLORINE: To Dubai: Century Chemicals, 11,700 kgs., Rs. 17,339; To Louis: Century Chemicals, 11,700 kgs., Rs. 17,550.

MAGNESIUM TRISILICATE: To Felixstove: Mazda International P. Ltd., 8,812 kgs., Rs. 2,00,000.

MANGANESE DIOXIDE: To Manchester: Oxides Exports India, 20,000 kgs., Rs. 1,46,600.

MALATHION TECH: Khattau Junker Ltd., 17,000 kgs., Rs. 5,41,237.

META AMINOPHENOL: To Yokohama: Hindustan Org. Chemicals, 120 kgs., Rs. 16,23,711.

META CHLORO ANILINE: To Kobe: Kalyani Steels Ltd., 5,175 kgs., Rs. 3,10,769; To New York: Kalyani Steels Ltd., 5400 kgs., Rs. 3,02,144; To Shanghai: Valiant Chemical Corporation, 12,000 kgs., Rs. 7,08,763.

METANILIC ACID: To Antwerp: Sate Chem. P. Ltd., 5,000 kgs., Rs. 1,47,200; To Rotterdam: Jeevan Products, 14,500 kgs., Rs. 5,34,411.

META PHENYLENE DIAMINE 4 SULPHONIC ACID: To Bangkok: Espee Chemicals, 1280 kgs., Rs. 1,08,231.

Odessa: Gujarat Alkalis P. Ltd., 36,000 kgs., Rs. 1,87,200.

METHYLENE CHLORIDE: To Keelung: Gujarat Alkalies & Chemicals Ltd., 36,000 kgs., Rs. 1,88,814; To Odessa: Gujarat Alkalies & Chemicals Ltd., 72 Mts., Rs. 2,74,400.

METHYL PARATHION (TECH): To Manila: Bayer (India) Ltd., 16,000 kgs., Rs. 7,22,938.

NAPHTHA: To Colombo: Indian Oil Corporation Ltd., 38,500 kgs., Rs. 6,53,25,966.

M-NITRO ANILINE: To Rotterdam: Sandoz (I) Ltd., 1,500 kgs., Rs. 1,04,567.

OXALIC ACID 99% MIN: To Rotterdam: Excel Industries Ltd., 20,000 kgs., Rs. 1,80,412.

OXYPHENZUTAZONE BP 80: To Hamburg: Euresian, 100 kgs; Rs. 39,000.

PARA CHLOROANILINE: To Keelung: Atul Products Ltd., 5,000 kgs., Rs. 2,70,876.

PARADICHLOROBENZENE: To Odessa: Chemie Organic, 15 Mts., Rs. 1,91,250.

PARA NITRO TOLUENE: To Yokohama: Hindustan Organic Chemicals Ltd., 14,000 kgs., Rs. 2,84,149.

PHOSPHORUS TRICHLORIDE: To Aqaba: United Phosphorus Ltd., 1,32,000 kgs., Rs. 18,24,484.

PHTHALIC ANHYDRIDE: To Bangkok: Herdillia Chemicals Ltd., 54,000 kgs., Rs. 4,03,608; To Kaoshiung: Mysore Petro Chemicals Ltd., 1,08,000 kgs., Rs. 8,07,217.

POTASSIUM IODIDE B.P.: To Hamburg: Kirti Chemicals, 1,000 kgs., Rs. 1,97,100.

RED OXIDE POWDER: To Port Said: Sharma Chemicals & Rubber Corporation, 30,000 kgs., Rs. 56,876.

R. SALT: To New York: Vivid Exports, 5,377 kgs., Rs. 1,64,818.

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SODIUM IODIDE BP: To Antwerp : G. Amphray Laboratories, 5,000 kgs., Rs. 11,97,487; To Hamburg : Kirti Chemicals, 1,000 kgs., Rs. 2,22,580.

SODIUM M-NITROBENZENE : To New York : Jeevan Products, 15,000 kgs., Rs. 2,88,067.

SODIUM META NITRO BENZENE SULFONATE : To New York : Jeevan Products, 360 Mts., Rs. 3,31,086 ; To Rotterdam : Sadhana Nitro Chem Ltd., 14,000 kgs., Rs. 2,93,547.

SODIUM NITROPRUSSIDE : To London : Belami Fine Chemicals Pvt. Ltd., 150 kgs., Rs. 55,394.

SULPHANILIC ACID : To Hamburg : Western Chemical Co., 18,000 kgs., Rs. 2,94,986.

YELLOW OXIDE POWDER : To Port Said : Sharma Chemicals & Rubber Corpn., 30,000 kgs., Rs. 22,325.

DRUGS MATERIALS EXPORTED BOMBAY
(From 2.2.88 to 8.2.88)

AMPICILLIN TRIHYDRATE BP : To Hamburg : Gujarat Ly-Ka Organics Ltd., 1000 kgs., Rs. 7,88,660.

BULK DRUGS : To Colombo : G. Amphray Laboratories : 2700 kgs., Rs. 65,612 : G. Amphray Laboratories, 4020 kgs., Rs. 2,77,604, Ranbaxy Laboratories Ltd., 50 kgs., Rs. 44,488/; To Hamburg : G. Amphray Laboratories, 3,000 kgs., Rs. 6,53,479/; Tal Pvt. Ltd., 1,000 kgs., Rs. 2,10,000.

CAPTAFOL TECH. : To Busan : Rallis India Ltd., 16,000 kgs., Rs. 11,65,593.

CLOXACILLIN SODIUM B.P. : To Hamburg : Gujarat Lyka Organics Ltd., 500 kgs., Rs. 4,87,758.

DRUGS : To Colombo : Biochem Pharmaceutical Indus., 192 kgs., Rs. 99,000; Torrent Laboratories Pvt. Ltd., 400 kgs., Rs. 94,000; To Hamburg : Manjarati Chemicals, 475 kgs., Rs. 1,11,000.

DRUGS & DRUG INTERMEDIATES : To Le Harve : Manjarati Chemicals 3,000 kgs., Rs. 2,02,000.

ERYTHROMYCIN ESTOLATE : BP 80 : To Hamburg : Chemifine, 395 kgs., Rs. 3,43,088.

ERYTHROMYCIN STEARATE BP : To Hamburg : Bombay Drug House, 500 kgs., Rs. 4,05,000.

FERROUS FUMARATE : To London : Hareshkumar & Co., 3,000 kgs., Rs. 59,218.

IBUPROFEN BP 80 : To Hamburg : Chandra Pharmaceuticals Ltd., 2,000 kgs., Rs. 4,41,000.

MAGNESIUM TRISILICATE TABLETS COMPOUND : To Maputo : Sarabhai International Ltd., 1,093 kgs., Rs. 39,730.

PHARMACEUTICALS : To Colombo : Torrent Laboratories Pvt. Ltd., 300 kgs., Rs. 60,800.

PREDNISOLONE: To Odessa: M.J. Exports Pvt. Ltd., 3,090 kgs., Rs. 13,05,335.

SULPHA METHOXAZOLE : To Hamburg : Apte Amalgamations Ltd., 8,500 kgs., Rs. 19,45,350; To Hamburg : Metro Exporters Pvt. Ltd., 8,500 kgs., Rs. 20,08,855; Metropolitan Industries, 5,000 kgs., Rs. 11,39,178. To New York : Priya Chemicals 500 kgs., Rs. 1,13,479; Priya Chemicals, 1,000 kgs., Rs. 2,33,031.

TINIDAZOLE : To Hamburg : Morani Chemicals Pvt. Ltd. 1,000 kgs., Rs. 2,28,400.

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(From 2.2.88 to 8.2.88)

DYE INTERMEDIATES : To Yokohama : Atul Products Ltd., 6529 kgs., Rs. 5,41,145.

TEXTILE AUXILIARIES : To Honkong : Textion Corpn. (Mfrs) 3,000 kgs., Rs. 5,29,639.

VINYL SULPHONE : To Jakarta : Espee Chemicals, 550 kgs., Rs. 1,72,490, To Kobe : Metrochem Indus. 1,750 kgs., Rs. 2,54,888; To Rotterdam : Liberty Exports Pvt. Ltd., 42,780 kgs., Rs. 44,39,952; Liberty Exports Ltd., 21,390 kgs., Rs. 22,20, 000.

VINYL SULPHONE ACETANILIDE : To Jakarta : Espee Chemicals 5,347 kgs., Rs. 3,36,360.

VINYL SULPHONE ACETANILIDE : To New York : Espee Chemicals, 10,697 kgs., Rs. 5,84,897.

Materials Imported

BOMBAY

(On 8.2.88)

ACRYLAMIDE : From Sweden : Tata Chemicals Ltd., 1020 kgs., Rs. 21,851.

ALPHA PHENYL GLYCINE HYDROCHLORIDE: From FRG: Manali Enterprise, 2,905 kgs., Rs. 9,45,820.

ALUMINIUM OXIDE SYNTHETIC : From Poland : Issa Jamal Group 5,000 kgs., Rs. 82,702.

COUMARIN : From FRG : The Jain Homoeopathic Pharmacy 500 kgs., Rs. 95,427.

N-CYANOETHYL-N-ACETOXYETHYL ANILINE : From Belgium : Industrial Cables (India) Ltd., 1,692 kgs., Rs. 1,02,189.

DIMETHYL FORMAMIDE : From FRG : IPCO Paper Mills Ltd., 14,820; Rs. 1,82,791; From kgs., Japan : Vijay Synthetic Print Pvt. Ltd., 3,800 kgs., Rs. 51,953; From UK : Oil and Natural Gas Commission, 7,600 kgs., Rs. 1,03,905; From U.S.A.: ECP Indus., 3800 kgs., Rs. 51,953.

2-ETHYL HEXANOIC ACID: From Sweden : Bhandary Metal Extrusion P. Ltd., 4,940 kgs., Rs. 72,475.

GUAIACOL TECHNICAL : From Korea: Mutual Steel Inds., 2,600 kgs., Rs. 1,88,024.

GUM ARABIC : From Japan: P.N. Dhoot Investment Co. Pvt. Ltd., 20,000 kgs., Rs. 1,55,799.

GUM ROSIN : From Sweden : Patsan Hygiene Inds. Pvt. Ltd., 90 Mts., Rs. 6,19,301.

HEDIONE : From Japan : P N Dhoot Investment Co. Pvt. Ltd., 2,000 kgs., Rs. 8,55,520.

HYDRAZINE HYDRATE 80% : From FRG : Bayer Ltd., 5,400 kgs., Rs. 1,38,115 ; From Japan : Natrarlal & Co., 6,000 kgs., Rs. 1,53,461.

HYDROGEN PEROXIDE 50% : From Canada : I.E.L. Ltd., 4,200 kgs., Rs. 36,372. From Italy : Larsen & Toubro Ltd., 8,400 kgs., Rs. 72,744; From Japan : Fluoro Carbon Processing Inds., 4,200 kgs., Rs. 36,372.

8-HYDROXYQUINOLINE : From Saudi Arabia : Gupta Plastic Udyog, 1,500 kgs., Rs. 2,65,832.

ISOBUTANOL : From FRG : Meerut Homeopathic Pharmacy, 46,800 kgs., Rs. 2,87,344.

LACTOSE : From Japan : P.N. Dhoot Investment Co. Pvt. Ltd., 12,000 kgs., Rs. 1,05,816, From USA : Korea India Ltd., 5,000 kgs., Rs. 62,817.

LITHIUM HYDROXIDE MONOHYDRATE: From Japan: New India Oil Trading Co., 19,000 kgs., Rs. 9,12,175.

MALEIC ACID FOOD GRADE BP/USP : From Japan : Crompton & Greaves Ltd., 19 Mts., Rs. 3,20,686.

MORPHOLINE : From Poland : Continental Tin Printers, 5 Mts., Rs. 1,27,757.

OLEIC ACID AMIDE SULPHONATE : From Japan : Samrat Switchgears, 15 kgs., Rs. 24,083. z z

ORTHO AMINO PHENOL : From Japan : Samrat Switchgears, 50 kgs., Rs. 12,736.

PARA PHENYLENE DIAMINE : From Japan : Samrat Switchgears, 360 kgs., Rs. 1,06,052.

POVIDONE IODIDE USP : From Japan Janata Fabricators; 2,500 kgs., Rs. 5,09,537.

PROPIONIC ANHYDRIDE : From FRG : Indravadan & Co., 3,230 Mts., Rs. 1,20,929.

PROPYLENE GLYCOL USP: From Belgium : Indl. Cables (India) Ltd., 17,200 kgs., Rs. 1,84,232.

PROPYL ZITHATE : From Tanzania : Hindustan Transmission Product, 300 Lbs. Rs. 13,672.

PYRAZINAMIDE : From USA : Mazagon Dock Ltd., 750 kgs., Rs. 3,84,835.

ROCK PHOSPHATE : From FRG : Indox Afrique Papers Mills Ltd., 17,650 Mts., Rs. 1,37,56,743 Mehta Opticians, 2,000 Mts., Rs. 14,82,582.

RONGALITE DP : From FRG : Goa Instruments Ltd., 5 Mts., Rs. 2,03,397.

RONGALITE DP : From Sweden : Andhra Sinter Ltd., 5 Mts., Rs. 2,04,922 ; Mohindra Engineering & Chemicals, 5 Mts., Rs. 2,04,922.

RONGALITE DS : From FRG : Goa Instruments Ltd., 5 Mts., Rs. 3,47,920 ; Andhra Sinter Ltd., 5 Mts., Rs. 3,47,920 Mahindra Engineering & Chemicals, 5 Mts., Rs. 3,47,920.

SODIUM POLYHYDROXY ALUMINA MONOCARBONATE HEXITOL : From Japan : Fluoro Polymer Processors; 408 kgs., Rs. 25,766.

TARTARIC ACID FINE POWDER : From Afganistan : Simi Bhatia : 2,000 kgs., Rs. 87,765.

TARTARIC ACID : From Japan : Samrat Switchgears, 290 kgs., Rs. 1,18,783.

ROCK PHOSPHATE : From FRG : Indo Afrique Paper Mills Ltd., 17,650 Mts., Rs. 1,37,56,743.

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HDPE BLOW MOULDING GRADE : From FRG : Machines and Mobile Exports, 15 Mts., Rs. 1,60,177, Larson & Toubro Ltd., 10 Mts., Rs. 1,06,785; From Jordan : Pratap Metal Corpn., 10 Mts., Rs. 1,06,785, From : Netherlands, Wander Ltd., 10 Mts., Rs. 1,06,785; From Taiwan : Shree Shyam Impex, 10 Mts., Rs. 1,06,785; From Zambia : Parikh Metal Inds., 30 Mts., Rs. 3,20,354.

HDPE MOULDING POWDER: From FRG : Sevantilal Kantilal Pvt. Ltd., 16 Mts., Rs. 2,10,776 ; From Singapore : Kajodimal & Co., 16 Mts., Rs. 2,11,075.

LDPE : From FRG : DLF Universal Ltd., 99 Mts., Rs. 14,13,876; From Iraq ; Aravind Bhanji Lodaya : 25 Mts., Rs. 3,09,247; From Iraq : Harish Bhanji Lodaya : 25 Mts., Rs. 3,09,247 Mahavir Traders 25 Mts., Rs. 3,09,247 From UK : Cummins Diesel Sales & Service, 82.5 Mts., Rs. 11,78,230.

LLDPE : From FRG : Rainbow Varnish Mfg., Co. Pvt. Ltd., 24.75 Mts., Rs. 3,06,875.

POLYACETAL RESIN : From FRG : Sevantilal Kantilal Pvt. Ltd., 9 Mts., Rs. 2,27,855.

POLYACETAL RESIN: From Switzerland : S.H. Kelkar & Co., Ltd., 4 Mts., Rs. 1,01,269, From USA : Hareshkumar & Co., 4 Mts., Rs. 1,01,267.

POLYETHYLENE : From China : Motisons International : 38,400 kgs., Rs. 6,85,515; From Korea : Cadila Chemicals Pvt. Ltd., 22.5 Mts., Rs. 3,20,973.

POLYOL : From UK : Upper India Tannery : 15.96 Mts., Rs. 2,59,016.

POLYSTYRENE : From Finland : West Coast Paper Mills Ltd., 17 Mts., Rs. 3,24,451; From Japan : Bhaba Atomic Research Centre, 34,000 kgs., Rs. 6,22,417; National Steel Inds. Ltd., 17 Mts., Rs. 3,11,208; From Mexico: Sainath Inds., 10 Mts., Rs. 1,43,371.

POLYTERPENE RESIN : From FRG : Cable Corpn. India Ltd., 1020.6 kgs., Rs. 23,189.

POLYTETRA FLUOROETHYLENE : From FRG : Bharat Heavy Electricals Ltd., 1400 kgs., Rs. 1,79,169; From Japan : P.N. Dhoot Investment Co., Pvt. Ltd., 3,000 kgs., Rs. 3,40,810.

PVC LIQUID RESIN : From Taiwan : Sanchi Leathers (P) Ltd., 360 kgs., Rs. 5,842.

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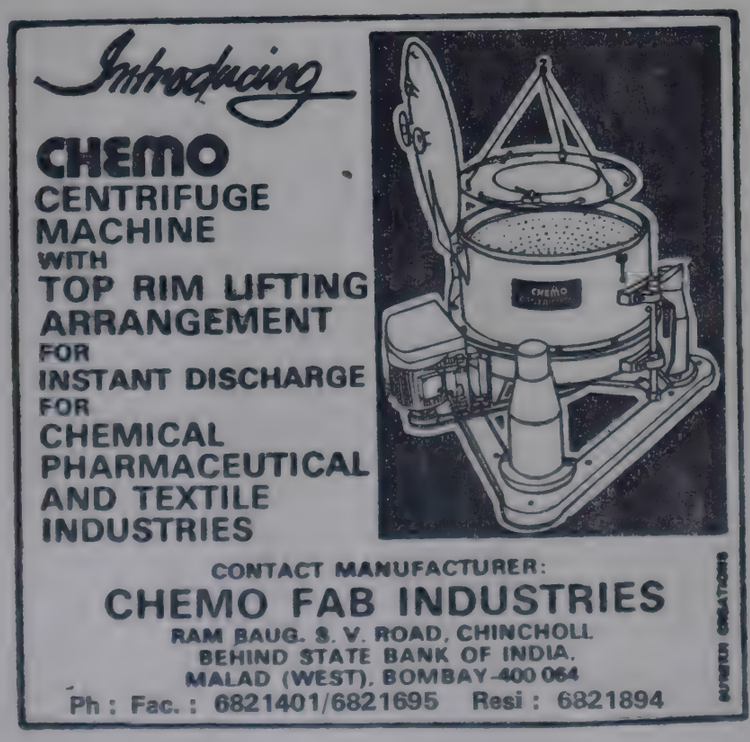
STYRENE ACRYLONITRILE RESIN : From Japan : OM Electronics, 18.370 Mts., Rs. 3,30,326.



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